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Statistical Research in Cancer¹

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IN Canada, the first major step in the cancer control program at the national level was taken in 1931 when the Canadian Medical Association appointed a study committee on cancer. This was followed in 1935 by the first national effort to raise funds for cancer research. The sum of \$489,000 was contributed and was known as The King George V Silver Jubilee Cancer Fund for Canada in commemoration of the twenty-fifth anniversary of the succession of King George V to the throne. (It is of interest to note that in 1955 the Canadian Cancer Society raised \$1,760,000 across Canada.) In 1938 the Canadian Cancer Society received its Dominion Charter and became the organization responsible for lay education, fund raising and welfare in this field, and in 1947 the National Cancer Institute was formed as the body responsible for the professional aspects of the work. The efforts of the National Cancer Institute of Canada are directed along three major lines: the stimulation of fundamental cancer research, the education of the medical profession in the cancer problem, and the promotion of reliable case histories on cancer patients. It is the last of these, the promotion of reliable case histories on cancer patients, which provides much of the basic data for statistical research. In addition to this source is the information on mortality from cancer provided by the provincial vital statistics offices and the Dominion Bureau of Statistics. Much might be said regarding mortality data in cancer. At this point I wish only to comment on the effort which is presently expended in Canada to ensure that these mortality data are as accurate as possible. From personal knowledge I would compliment all those who have a responsibility in this field for the reliability of the data which they produce.

The National Cancer Institute organized the statistical phase of its work in 1950. At that time only three of the provinces had well organized cancer

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records programs. Only six years ago it was impossible to consider statistical cancer research at the national level. Today every treatment center in Canada records certain minimum data on each patient so that it is now possible to combine the data of center with center and province with province. The success of this move toward standardization is, in large measure, the result of the co-operation of all clinicians working in the cancer field.

This standardization of data has led to a consideration of cancer incidence studies at the provincial level. There is no doubt that a measure of the amount of cancer which may be expected annually in our population is a valuable statistic. At the present time one province has already begun an incidence study while four others are in the process of organization. In addition to this effort, three other incidence studies have been made, namely: in Canadian Indians, in a sample of our French-Canadian population, and in a sample of nuns. The study of the disease in Indians, which covered the five-year period 1948-1952, showed that, under the age of 30 years, there is no difference in the incidence of cancer between Indians and whites, but over this age the incidence among Indians is apparently less than among whites. The Indians have a lower incidence of skin cancer but a higher incidence of cancer of the cervix uteri and in this latter site the disease tends to occur earlier in life among Indians. Except for these two sites, the incidence of cancer in Indians appears to be no different from whites. This statistical research has disputed statements made as early as 1928 and 1936 which indicated that cancer among Canadian Indians was very rare and has prompted the Indian Health Services, Department of National Health and Welfare, to organize a cervical smear program in an attempt to detect early cases of female genital cancer.

The incidence studies in nuns and French-Canadians have been conducted concurrently for the past two years. The absence of cervical cancer in nuns had been reported previously; however, the present study covers all sites of the disease. Although the analysis of the data has not been completed, there are indications that nuns suffer from all forms of cancer (except cervical as previously noted). Comparison with the results from the French-Canadian study will show whether there is a significant difference by site of disease between the nuns and a sample of the normal population. This sample numbers approximately 270,000 persons living in Quebec City and surrounding areas. Statistical research in cancer in special groups of our population, such as the nuns, offers possibilities which are not to be found in samples of the normal population. Variables such as environment and diet are controlled, while the variation in medical services is reduced to a minimum. Unfortunately, there is only a very limited number of such groups available for study.

The case histories which are compiled in the various treatment centers offer another source for statistical research. In this field, analyses of sites of disease are most productive and the site which receives much attention here is the breast, perhaps because the treatment of this lesion has been somewhat disappointing. It has been noted for some years now that the overall five-year survival rate for breast cancer in any large treatment center ranges between 35 per cent and 40 per cent. This consistency is generally explained by the fact that the treatment has not changed appreciably over the years. In fact, the

surgical procedure, the radical mastectomy, is much the same today as when it was introduced by Dr. Halsted at the turn of the century. This lack of improvement in the survival rate is undoubtedly responsible for the attention paid to breast cancer. In a review of over 800 cases in one of our large teaching hospitals where surgery and radiation therapy are somewhat standardized, the proportion of patients living five years after diagnosis conformed closely to previous findings. The first encouraging signs of improvement have been reported from the province of Saskatchewan, where the five-year survival rate since 1944, when free cancer services came into being, has been shown to be 48.3 per cent. The statistical analysis of this series of cases has been thoroughly checked and explanations for the improvement have been offered. For example, the proportion of early cases has increased steadily, the follow-up of patients has received continuing attention (less than 1.5 per cent of all cancer patients in Saskatchewan have been untraced) and the majority of the surgery is performed by surgeons holding fellowships in the Royal College of Surgeons.

In recent years, the advantages of the simple mastectomy as opposed to the radical have been illustrated by Dr. McWhirter of Edinburgh, who has shown a 10 per cent increase in survival rates following simple surgery. The chief criticism of this thesis has been concerned with the population from which the Edinburgh cases are drawn. It is argued that changes in the population have occurred between the time when radical operations were performed and the change to simple surgery took place. Also it is argued that patients are now seen at an earlier stage of disease, when the cancer is probably confined to the breast itself and the simple mastectomy removes it completely. In Canada our interest in this change of treatment is based on the fact that, in one province, the McWhirter technique is being followed. The need arises, therefore, for a statistical research project which is designed to show whether or not the results of simple surgery are significantly different from radical surgery. Such a study is presently being considered by the National Cancer Institute and it will be appreciated that the statistical framework for such a project is all-important for on the basis of statistical results may rest the lives of future breast cancer patients.

Radiation Therapy

Turning to another type of statistical research in cancer, it will be recalled that in the autumn of 1951 the first news appeared regarding a new form of radiation therapy in cancer, namely, Cobalt 60. The first publicity given to the so-called "bomb" was, to some extent, incorrect, and, to a large extent, unfortunate. Those working in the cancer treatment field appreciated the qualities of Cobalt 60 radiation but they also appreciated that, being a destructive agent, it could not be considered a cure for cancer. The question to be answered is, "How successful is this new form of treatment?" and here Canada, as the first country to have Cobalt 60, has a definite responsibility. Subjective opinion will not suffice. The assessment of such an important contribution to the field of cancer therapy must be conducted along scientific lines. This is presently being done in Canada. Since most cases of cancer of the

larynx are now treated by Cobalt 60, this site has been selected as a starting point. Using the "matched-pairs" technique, each treatment center in Canada has been invited to submit certain data on larynx cases treated by Cobalt 60 and those treated by some other form of radiation. Within each clinic a Cobalt 60 case is being matched with one treated by some other form of radiation and an assessment of the two types of treatment is being made in terms of years of life of the patients.

A number of adjuncts to actual treatment have been proposed. Two of these are the use of testosterone (the male hormone) in cancer of the cervix and the inhalation of oxygen, immediately prior to, and while receiving, radiation therapy. The use of testosterone in cervical cancer is based upon limited investigations which seemed to show that this hormone made the tumour more radio-sensitive. In the case of the inhalation of oxygen there is an indication that such a procedure is beneficial to the patient. These problems are presently being investigated using the "control experimental series" technique in the clinics in Hamilton and Saskatoon.

Cancer Mortality Data

Statistical research into cancer mortality data has revealed some valuable results. The recent emphasis on the increase of lung cancer and the proportional increases reported by many countries prompted a review of the mortality data in Canada for the period 1931-1952. This study showed that, of all cancer deaths, those reported as due to lung cancer had increased from 2.2 per cent to 8.7 per cent. For males the increase was from 3.0 per cent to 13.4 per cent and for females from 1.4 per cent to 3.2 per cent. The standardized death rate increased from 2.4 to 10.7 per 100,000 population; the male increase was from 3.0 to 17.0 per 100,000 and the female from 1.6 to 3.7 per 100,000. The ratio of male to female lung cancer deaths increased from 2-to-1 to 5-to-1. These results conform with those reported for Denmark, England and the United States. There is considerable doubt regarding the reliability of such analyses since it is impossible to measure the relative accuracy of the data on the death certificates or the degree of improvement in the diagnosis of lung cancer. It may be, therefore, that a part of the noted increase is artificial but one would hesitate to ascribe the whole to the variables of medical opinion and improvement in diagnostic techniques.

In addition to lung cancer mortality an investigation has been made of mortality trends in 10 of the more common sites of cancer for the period 1941-1953. In this study the best fitting line was fitted to the standardized rates for each site and the slope of the line tested statistically for a significant rise or fall. The results of this work indicated that: (a) for males, a significant decrease in mortality from cancer of the lip, tongue and mouth had occurred, (b) significant decreases for each sex were noted in mortality from stomach cancer, (c) for deaths from cancer of the respiratory system a significant increase in males was found but the female increase was not significant at the 5 per cent level of confidence, (d) a significant increase in mortality from cancer of the urinary organs in males was noted, (e) no significant change had occurred in deaths from breast cancer in the female, (f) a significant decrease

was found in mortality from cancer of the uterus (*corpus uteri*) but a significant increase was found for the cervix, (g) significant increases for males and females from leukaemia and aleukaemia were found.

As in all fields of research, certain problems have arisen which may be of general interest. For example, the decennial revisions of the International List of Causes of Death often make it impossible to combine mortality data for an interval of more than 10 years. Fortunately, the Dominion Bureau of Statistics has prepared comparability ratios which permit the combination of the data according to the fifth and sixth revisions of the List, i.e. as far back as 1940, but care must be exercised in the analysis of data prior to that year.

A problem arises, too, in the calculation of five-year survival rates since so many statistical and mathematical correction factors have been proposed. Only one of these seems completely satisfactory. This is an adjustment for the natural forces of mortality in the population under study. In skin cancer, for example, the age distribution of patients is skewed toward the older ages and the adjustment for the probability of not dying of any cause in a five-year period at these older age-levels may raise the five-year survival rate as much as 20 per cent. It seems only fair that the measure of the success of treatment for this site of cancer, or for any site, should not be influenced by the natural mortality factor.

It is hoped that this presentation of some of the projects and problems which have received attention in the field of statistical research in cancer will indicate the types of investigations which lend themselves to this method of attack. True, only a beginning has been made but new problems continually arise and no doubt the program will continue to expand. There is evidence already that the findings of such investigations play an important part in the further understanding of cancer and in directing some of the laboratory effort in cancer research.

Prepaid Medical and Hospital Care by the Check-off System in Cape Breton¹

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THE medical services for the miners and their dependents in the Cape Breton area are provided by five different hospitals and thirty-eight doctors. These services are supported by the check-off system whereby the Dominion Coal Company deducts from the wages of its employees fixed amounts for specified services. These wage deductions are a condition of employment; a miner going to work in any mine must check-off to a certain doctor and hospital before he can be employed.

The earliest information on the check-off system is found in the minutes of the Provincial Workers' Association, the miners' union prior to the organization of the United Mine Workers' Union, and these show that deductions were made for the services of doctors and support of schools prior to 1883. In 1903 the practice of holding back specified amounts from the payroll of the miner was approved by the provincial legislature and in 1918 a bill was passed in the provincial legislature making it compulsory for all miners to have deductions made for both hospital and doctor. Since then, the check-off has been used to deduct money to pay for taxes, support of churches, relief societies and many other types of payments, and the miner today supports most of his charitable organizations as well as schools, doctors and hospitals through the check-off. This is one of the weaknesses of the check-off system because it relieves the miner of a sense of responsibility in these matters.

In 1926, a Royal Commission on the coal mining industry of Nova Scotia recommended that the check-off be abolished except for hospital services but nothing came of this recommendation and the check-off system is still in vogue in all the coal mining areas in Cape Breton.

SUBSCRIBERS' PAYMENTS

Practitioners' services. The wage deductions for check-off have varied greatly over the past forty years. In 1914, men working in Company stores or railroads paid 30¢ a month if they were single and 40¢ a month if married. The miners at this time paid 40¢ a month if single and 50¢ a month if married, for which the doctor supplied all drugs, surgical, obstetrical and medical services. The only exception was that the subscriber was to pay \$5.00 for confinements, but this was rarely done. In 1916, the rate was increased to 60¢ a month. In 1920, the rate was increased to 25¢ per week for all subscribers and this continued until 1925 when there was a strike that lasted six months. During that

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time, the doctors and hospitals supplied the same services but received no money and when the men did go back to work they did not pay back the check-off that should have been paid during this period. About 1927, the rate was increased to 40¢ per week, both to hospital and doctor, and this rate continued until 1947 when the doctors were refused a further raise and thereupon refused to dispense drugs. Over the next three or four years there was constant bargaining. One offer put forward by the doctors at this time was that for 90¢ a week they would give complete care including specialists' care; this was brought before the various union locals and was turned down. Following this refusal, the doctors refused to supply drugs and the 40¢ a week covered only medical, surgical and obstetrical care. It was soon discovered that people did not buy drugs when the doctor did not supply them. After about a year, it was agreed that the miner would pay \$1.00 a week to the doctor for which he would receive complete medical, surgical and obstetrical care, as well as ordinary drugs; such drugs as insulin, cortisone, expensive antibiotics, and some of the more expensive vitamins were not supplied. There was also a clause in this agreement that the subscriber would pay \$10.00 for confinement cases but this is rarely ever paid and the doctors do not make any effort to collect it. Today, about 80% of the miners pay \$1.00 a week and get the full services, the other 20% pay 40¢ a week and buy their own drugs. This \$1.00 per week paid to the doctor does not carry any weekly indemnity; the subscribers pay an extra 25¢ a week to their relief society and in return may receive \$14.00 per week for six months, after that the amount is gradually reduced until it expires at the end of two years. The Dominion Coal Company contributes from \$8,000 to \$10,000 a year to this relief society.

Specialists' care. Under this system, specialists' care is not provided, but there is an exception to this in Glace Bay where a clinic or group practice has been formed. Here the doctors, if necessary, will themselves pay an eye, ear, nose and throat specialist for treatment of injury or disease to the eyes or removal of a foreign body from the oesophagus, but refractions are not covered.

Hospital care. The subscriber also pays \$1.25 a week for hospital care and this is the same for single or married men. Twenty-five years ago they paid 30¢ a week but it has gradually been increased up to the present rate. For this \$1.25 a week, the subscribers and their dependents receive ward bed care which can go on indefinitely. They get free operating room services, free case room services and almost free laboratory and X-ray services. For laboratory services there is now a nominal charge which may vary from 50¢ to a maximum charge of \$3.00 regardless of how much work has been done. There is also a nominal charge for X-ray work which ranges from \$1.00 to \$5.00 and \$5.00 is the maximum, even though a man may have had a complete radiological survey while in hospital. The miners themselves, however, bitterly object to this so-called "extra billing". While in hospital, the subscriber receives, at no additional charge, the ordinary standard hospital mixtures such as cough mixtures, tonics, aspirins, penicillin and insulin, but such items as expensive antibiotics, cortisone and liver extract are charged for. All dressings are free. Men who have been pensioned off from the coal mine pay \$1.00 a month and receive

all the privileges mentioned. If the man or his dependent wishes to take a private room, he pays \$1.50 a day and if it is for an obstetrical case, \$2.00 a day extra. The hospitals paid by the check-off still run on a deficit though it is not as large as that of the privately owned hospitals in our area. Hospital authorities admit that if it were not for the shortage of beds, their deficit would be greater.

Under the check-off system, the Compensation Board does not have to pay either the doctor or hospital for treating a man who has been injured in the mine, so the Company and the Compensation Board are not too anxious to have this system changed. In discussing this matter with the men active in the local unions, they claim that this is their biggest hurdle to get over in trying to get the system changed.

Volume of Service. I would like to give a rough outline of the work done by one of the practitioners in the Glace Bay area. He has 500 subscribers or roughly 2,000 people to look after. He does about 200 confinements a year, about 130 major operations and 250 minor operations; these minor operations include tonsillectomy, teeth extractions, lacerations, etc. He sees about 40 patients in his office each day and besides this he makes 12 to 15 house calls a day. Ordinary procedure, such as pelvic examination, suturing of any extent, blood counts and urinalysis, are not done in his office but are done in the out-patient department in the hospital at a very minimal cost to the patient. This man would earn approximately \$25,000 a year, out of which he pays an assistant about \$7,500 and his drugs and supplies would cost him roughly \$3,000, but in talking this over with the clinic group in Glace Bay, they state that their staff, drugs and supplies consume about 50% of their gross income.

ADVANTAGES OF THE CHECK-OFF SYSTEM

A. *As relating to the doctor.*

- There is very little bookkeeping to be done as most of the money comes in a monthly cheque.
- Office expense is much less for the individual doctor although in the group practice the office expense is fairly high.
- There is less competition than in private practice, because subscribers tend to stay with the practice they have been paying into, so that a new man coming into a practice recently vacated finds himself with a steady income of good proportions immediately.
- The conscientious doctor can give good surgical and obstetrical care but his medical care, in my opinion, is not up to par for the simple reason that he does not have sufficient time to spend on the patients.
- Care can be given without too much worry about expense to the patient but the doctor works much harder than the man in private practice because the person who pays the \$1.00 a week feels he must get his money's worth and there is a consequent demand for over-servicing.

B. *As relating to the hospitals.*

- They have ready money coming in all the time which, however, is usually not enough.

- The patient in hospital demands less service than in the privately run hospital.

These are about the only advantages the administrators could tell me when I asked them.

C. *As relating to the patient.*

- Freedom from worry about most medical and hospital bills.
- There is a feeling that a doctor can be reached whenever he is needed.

DISADVANTAGES OF THE CHECK-OFF SYSTEM

A. *As relating to the doctor.*

- He has not enough time to spend on the proper investigation of the patients in the office because he has too many patients to see. Most of the doctors stated that the majority of patients coming to their office do not want to be examined; they have a complaint and they want a bottle of medicine or a box of pills to cure them.
- The doctor-patient relationship is poor. People apparently have no concern as to when or for what reason they call a doctor. Calls that could be made quite easily in the daytime are often made late at night with the demand that the doctor come at once and this has created a feeling of hostility between many of the patients and the doctor.
- The doctor finds it difficult to weed out the incompatible patients.
- A conscientious doctor becomes a slave to his practice.
- The doctor gets \$1.00 a week from each subscriber but if the subscriber is off work for any reason such as illness, strike, injury or holidays the doctor does not get paid. A very good example of this was during the 1925 strike, which lasted six months. The doctors did not receive any money during that time, but they still had to give all the usual services. For example, one doctor had a weekly pay check of \$3.00 during this time.
- There is a lack of respect for the doctor and his family.
- If a man pays a doctor for three months then the doctor must look after him as long as he lives even though the man no longer pays him any money.
- There is too much time spent in dispensing drugs.
- The subscriber feels that he must get his money's worth and there is a consequent demand for over-servicing.
- All the relatives of the subscriber are looked after free.

B. *As relating to the hospital.*

- The patient stays much too long in hospital. In 1955, the average stay for medical cases in one of the Glace Bay hospitals was 30.3 days.
- The hospital still runs at a deficit.
- The patients are more demanding to get into the hospital. Each one feels that he should not have to wait when he needs to go to hospital and with the shortage of hospital beds the patient cannot always be admitted when he wants to go.
- The subscriber who is away sick, on strike, or on his holidays does not pay his \$1.25 to the hospital. An effort is made to collect this when the man returns to work but this is difficult to do and gives rise to much ill-feeling.

- The pensioners of the Dominion Coal Company are not paying enough, only \$1.00 a month, and this is one of the big causes for the hospital deficit.

C. *As relating to the subscriber.*

- Lack of specialists' care. This general statement is made even though the doctors in some cases do pay for the services of some specialists. It is true, however, that when a subscriber needs the services of a cardiologist, neurosurgeon or chest surgeon he will have to pay for him out of his own pocket.
- The subscriber has no hospital coverage or medical-surgical coverage when away from his own town.
- The doctor receiving the check-off may hire a young doctor just out of college and then he can go away for a year or two and still receive the amount of his check-off even though he pays a much smaller amount to the man that is replacing him.
- The subscribers complain bitterly that they still have to pay extra in hospital for X-ray and laboratory work and for the more expensive drugs, even though the charge is nominal.
- The subscriber feels it very unjust that he should receive a bill after being in hospital for a compensable injury. In other words, even though he is a compensation case he still has to pay for some drugs, for some of the laboratory work and for some of his X-ray work.

Generally speaking, the subscriber could be described as being unhappy with his set-up and many of them feel that they should have some change; this is particularly true in the higher levels of the union leadership.

This, then, is a résumé of one of the oldest prepaid hospital and medical plans on the continent and I hope that I have given some idea of its methods of financing, its short-comings, and its advantages.

THE PSYCHIATRIC UNIT IN THE GENERAL HOSPITAL¹

DR. PAUL V. LEMKAU²

The chief advantages of the psychiatric unit in the general hospital are three: (1) the more efficient treatment possible for the patient who is near his home; (2) the better treatment available to patients when therapy is carried out in the active medical center, namely, the general hospital; (3) the improved opportunity for increasing the psychiatric education of physicians, both specialists and general practitioners.

¹Abstract of an article which appeared in *Mental Hygiene News*, January, 1957.

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Recent Observations on Type E Botulism¹

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JUST over 20 years ago, Gunnison, Cummings and Meyer (1) proposed the designation *Clostridium botulinum* type E for several cultures sent to them for identification by Russian bacteriologists. These cultures had been isolated from the intestines and muscle of sturgeon. Since then, about 100 type E strains have been isolated from the flesh of fish and marine mammals implicated in outbreaks of human botulism in various countries of the Northern Hemisphere (2, 3); from soil, lake shore or sea mud in British Columbia (4), Japan (5), Denmark and Greenland (6); and from normal fish intestines in France (7) and Japan (5). Some 50 of these cultures have been collected in this laboratory for intensive study, and a summary of their chief cultural, biochemical and toxigenic characteristics will be the first objective of this report.

Secondly, the fickle and comparatively feeble toxigenic characteristics of even freshly isolated type E strains are in marked contrast with the unusually rapid course and the heavy fatality rate in many outbreaks of type E botulism. Recent observations in this and other laboratories seem to reconcile these discrepancies more satisfactorily than the various hypotheses hitherto suggested.

Thirdly, human botulism of this type displays certain ecological and epidemiological peculiarities which merit further consideration.

MATERIALS AND METHODS

For primary isolation of *Cl. botulinum* type E, and for study of its cultural mutants, the following media and techniques proved the most useful.

1. Glucose-peptone-beef infusion broth, with ground meat ("GPBI meat").

Into large tubes, about 5 gm. of infused ground meat are dispensed, followed by 20 ml. of a beef infusion broth containing 0.5 per cent NaCl, 0.08 per cent Na_2HPO_4 , and 1 per cent Difco peptone. After sterilization by autoclaving, this medium may be stored for long periods in the refrigerator. Before use, the tubes are placed in boiling water to expel dissolved oxygen. When cool, they are inoculated with 2-5 gm. of suspected foodstuff or soil sample. Sufficient sterile glucose solution is then added to give 2 per cent.

To discourage growth of aerobes from heavily contaminated sources, we have usually heated the inoculated medium to 60° C. in a water bath for 15 minutes. Apparently the spores of a few type E strains can withstand exposure to 100° C. for as long as 30 minutes (2), but all workers agree that in general type E spores exhibit very low thermal stability. Indeed, Pedersen recently found that exposure of inocu-

¹Based on a paper presented at the twenty-fourth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, December 10 and 11, 1956.

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lated media to 80° C. for only 5 minutes prevented the isolation of many type E strains from soil and sea mud (6).

Pure cultures grow well and produce toxin in this medium without special anaerobic conditions; but incubation in a McIntosh-Fildes jar favours the isolation of type E strains from mixed cultures. The optimal temperature of incubation is controversial. All strains seem to grow faster at 37° C. than at lower temperatures, but there is evidence that certain strains are most toxigenic at around 23° C., and may become atoxic at 37° C. (7, 6). Hence, for routine purposes, we now compromise with an incubation temperature of 30° C.

2. Blood agar medium ("BA plates").

The nutrient agar base contains 0.5 per cent Difco peptone, 0.3 per cent Difco beef extract, 0.8 per cent NaCl, and 1.5 per cent agar. This is dispensed into Erlenmeyer flasks and autoclaved. As needed, 5 per cent of citrated human blood is added to the melted base, and the mixture is poured into Petri plates.

3. Brain heart agar medium ("BH plates").

The nutrient base is 3.7 per cent Bacto Brain Heart Infusion powder, with 1.5 per cent of added agar. This is autoclaved and stored in flasks, to be re-boiled before pouring into Petri plates. BA and BH plates should be well dried to minimize growth-spreading tendencies. Type E colonies may be differentiated after 24 hours incubation at 30° C., or 18 hours at 37° C., but an additional 24 hours is sometimes advantageous. Complete anaerobiosis (preferably in a McIntosh-Fildes jar) is essential.

4. Medium for carbohydrate-fermenting tests.

Beef infusion broth with 1 per cent Difco peptone is the nutrient base. Shortly before use, 0.2 per cent sodium thioglycollate is added, and the mixture is re-sterilized in the autoclave after being dispensed into 13 × 100 mm. test tubes containing Dunham fermentation tubes. The various sugars are added in sterile solution, to give final concentrations of 1 per cent. Each tube is then inoculated with 4 drops of fluid culture. After 48 hours incubation at 37° C. in air, 3 drops of 0.4 per cent solution of bromthymol-blue indicator are added, and the degrees of acid formation and gas production are noted.

The pH of the foregoing media was adjusted, when necessary, to lie between the limits 7.2 and 7.8.

CULTURAL AND BIOCHEMICAL CHARACTERISTICS OF TOXIGENIC STRAINS

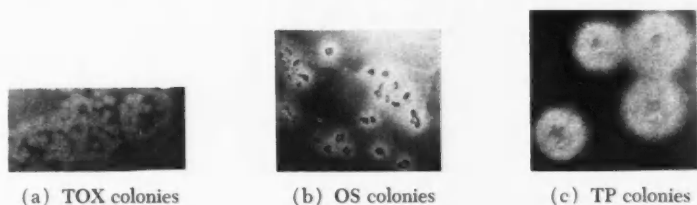
Since the first descriptions of type E strains by Gunnison *et al.* (1) and Hazen (8), there has been general agreement on their main characteristics (9, 7, 6, 5). Subsequent experience in this laboratory confirms that toxigenic strains from different regions and sources are remarkably homogeneous in appearance and behaviour. (However, we have established that various agglutinogenic groups occur among type E strains, even when isolated from the same part of the world (10). This accords with the findings of Nakamura *et al.* (5) in Japan.)

In the GPBI meat medium, toxic ("TOX") cultures show very distinctive effects. There is vigorous gas formation, without proteolysis, so that the entire mass of meat particles is borne to the top of the broth in a mantle of gas bubbles. Gas production may continue thus for several days, while a heavy white deposit of bacterial debris accumulates at the bottom of the tube, and the broth becomes pale and less turbid. Eventually, the bleached but intact meat sinks upon the white deposit, leaving the supernate colourless and clear.

On BA plates, after 24 hours at 30° C., numerous pin-point colonies may be

noted, surrounded by a narrow zone of faint haemolysis. (Fig. 1a). After 2-3 days at 37° C., the haemolytic effect is clearer, and colonies are 1-2 mm. in diameter. On the more richly nutrient BH plates, diameters up to 5 mm.

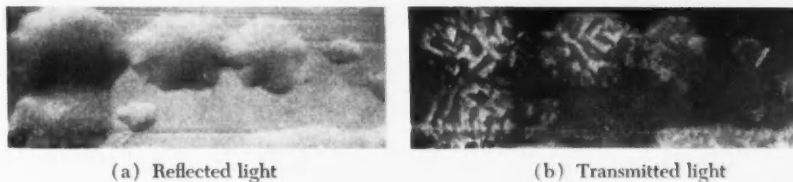
FIG. 1. Mutational phases of "VH" strain, grown on BA plate for 24 hours at 30° C.



may be attained, but relatively few colonies develop, and their size is quite variable. They are translucent, with bluish-grey sheen, and smooth or slightly granular texture. Smaller colonies generally appear as ovoid fragments with irregular edges, but larger colonies are apt to be more rounded, with slightly wavy margins. If either of the above media be inoculated while the surface is moist, growth is liable to spread diffusely in arborescent or frondose fashion, and may become confluent over the whole plate.

TOX colonies display a peculiar mosaic pattern of alternating light and dark areas when viewed by partially transmitted light through a low power objective. Figs. 2a and 2b show the same colonies photographed by reflected and transmitted light, respectively. (The light source remained constant,

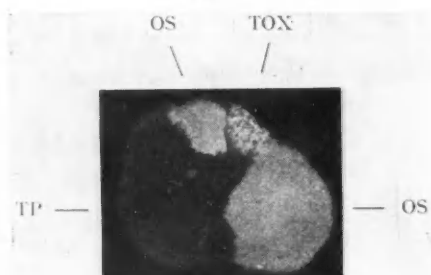
FIG. 2. "Iwanai" strain in TOX phase, grown on BH plate for 24 hours at 30° C.



but the angle of incidence was altered by tilting the microscope mirror.) The effect is apparently due to TOX organisms lying in closely packed, parallel lines, which follow a whorled pattern like a finger-print. This curvilinear arrangement causes an uneven scattering of light. The phenomenon has often facilitated the detection and picking of a TOX colony from a mutating culture, or of a TOX segment in a mutating colony (Fig. 3). Although in our experience no toxigenic type E culture has ever failed to show these mosaic-patterned colonies, the reverse does not always hold.

Microscopically, TOX cultures show marked pleomorphism and irregular staining, particularly when taken from BA plates. There are many vacuolated and tattered forms, and also Gram-negative "ghosts". Very few spores are seen.

FIG. 3. "VH" strain showing TP colony undergoing segmental mutation into TOX and OS phases.

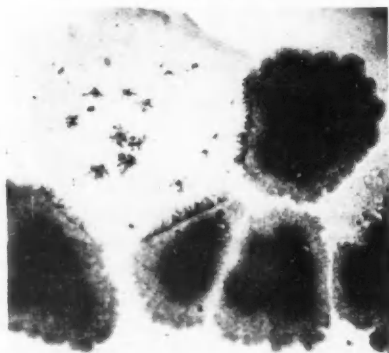


CULTURAL AND BIOCHEMICAL CHARACTERISTICS OF ATOXIC MUTANTS

Cl. botulinum cultures, regardless of their type, have a well-known tendency to become non-toxicogenic. Type E strains seem particularly prone to become atoxic. Several years ago, impressed with the facts that 3 of the original Russian strains had long been completely non-toxicogenic, and that our then recently isolated "VH" strain (9) had temporarily ceased to produce toxin, we began to seek possible correlations between colonial form and toxigenic capacity. Only a brief reference has hitherto been made to the unexpectedly fruitful results of this quest (11).

Under the colony microscope, an atoxic Russian strain ("E 2"), and also the "VH" strain, each showed two distinct colonial forms, which could be grown separately, and bred true, though retaining tendencies to reciprocal mutation (Fig. 4). The cultures thus derived showed many differences.

FIG. 4. "E 2" strain showing TP (light) and OS (dark) colonies.



On BH plates, one of the mutants (to be designated "OS") yielded opaque colonies of irregular size and shape and uneven surface, whose centres were darker than the periphery and prone to some form of lysis. Viewed by transmitted light, such colonies had a coarsely granular pattern interspersed with patches of brownish opacity. Higher magnification revealed densely packed,

short bacilli, the majority containing a yellowish refractile spore. *Sporulation* was especially conspicuous in the darker areas. On BA plates, this mutant was moderately haemolytic (Fig. 1b), while in GPBI meat it produced neither gas nor proteolysis. Stained preparations under the microscope showed Gram-positive rods, which nearly all contained an oval spore. The dark or lysed portions of OS colonies were composed mainly of amorphous debris and clumps of free Gram-negative spores.

The other mutant ("TP") grew on BH plates as *transparent*, flat, smooth colonies, of rather irregular shape and generally larger size than the TOX colonies described above. Viewed through a low power objective by transmitted light, these colonies showed a homogeneous, minutely granular pattern. A higher magnification revealed individual bacilli lying loosely arranged at all angles to each other. On BA agar, the TP colonies were markedly haemolytic (Fig. 1c). In GPBI meat medium, there was only moderate gas production and no white deposit, but the meat showed definite *proteolysis*. Microscopically, there was a mixture of well-formed, Gram-positive bacilli and Gram-negative ghosts. Spores were again very scarce.

Scrutiny of other non-toxicogenic type E strains showed some to be a biphasic OS \leftrightarrow TP mixture, while the remainder were wholly in the OS phase. In the light of these observations, a thorough examination of several toxigenic strains was undertaken. The conclusions reached may be expressed briefly as follows:

i. All TOX cultures apparently tend to degrade to a sporulating, atoxic (OS) phase. However, the rate and extent of this degradation varies widely. Some strains quickly and spontaneously become atoxic after very few transfers; others remain toxigenic many years after their first isolation; while perhaps the majority of strains exhibit intermediate degrees of stability.

ii. The TOX \leftrightarrow OS process is occasionally reversible, so that toxigenic capacity can be acquired by, or restored to, an atoxic strain. In such instances, advantage may be taken of the colonial mutational phenomena described above, to pick small TOX fragments from a predominantly OS culture. The "VH" strain, for example, was soon restored by this means to its original toxigenicity.

iii. A reversible, triphasic mutational combination may be noted rarely, representable thus: TOX \leftrightarrow OS \leftrightarrow TP. A more detailed analysis of some aspects of these interrelationships will be deferred for a later communication.

iv. The still rarer situation TOX \leftrightarrow TP will be considered in the next section of this report.

The distinctions drawn above between the properties of the TOX, TP and OS phases of type E strains extend to their carbohydrate-fermenting abilities, Table I sets forth the acid- and gas-producing reactions of 25 representatives of strains in the TOX phase, 4 in the TP phase, and 7 in the OS phase. Almost complete uniformity of behaviour prevailed among the cultures in each phase—a fact which in itself eliminates any reasonable likelihood that these mutants could be either fortuitous contaminants or customary symbionts.

On the other hand, the 3 groups of cultures were quite different in their effects upon the 7 carbohydrates listed. Many additional carbohydrates were tested, including lactose, arabinose, xylose, mannitol, dulcitol, inulin and

TABLE I—CARBOHYDRATE FERMENTATION REACTIONS OF *CLOSTRIDIUM BOTULINUM* TYPE E

Sugar	Mutational phase		
	"TOX"	"TP"	"OS"
Glucose	AG++++	AG	A
Fructose	AG++++	AG	A
Maltose	AG++++	AG	A
Sucrose	AG++++	O	A
Sorbitol	AG++++	(AG)	O
Glycerol	AG	(AG)	A
Salicin	O	A(G)	O

O = no acid or gas; A = acid; AG = acid and gas; (A) = sometimes acid; (AG) = sometimes acid and gas; A(G) = acid and sometimes gas.

starch. These are not in the table because their reactions were all negative. Vigorous saccharolytic effects are evidently exerted by TOX cultures not only upon glucose but also upon fructose, maltose, sucrose and sorbitol. The TP cultures are less actively saccharolytic in all respects save their ability to utilize salicin. A striking difference between the TP and TOX cultures is the failure of the former to ferment sucrose. The OS cultures produced no gas from any carbohydrate, but displayed the same acidification pattern as the TOX cultures, except for a negative effect upon sorbitol. The possible relationships of these biochemical differences to the toxigenic, proteolytic and sporulating propensities of the TOX, TP and OS mutants, respectively, clearly merit further investigation.

"ACTIVATION" OF TYPE E TOXIN

The total recorded incidence of type E botulism in all parts of the world (including 2 recent outbreaks in Alaska and Labrador, to be briefly outlined later) now stands at 145 cases, with 56 deaths, an average fatality rate of 38.6 per cent. This rate is more than double the 15 per cent average fatality rate often quoted for botulism in European countries, where type B outbreaks have been predominant; and, of course, it is much higher still than the astonishingly low case fatality rate of 2 per cent reported for about 1,000 cases of type B botulism which occurred in France during the 1940-44 occupation (12). Moreover, type E outbreaks seem to have displayed a particularly wide range in mortality. For example, in 2 Alaskan episodes, only 1 person died out of 8 affected (12.5 per cent), whereas in 4 British Columbian occurrences, there were 6 deaths among 9 affected persons (66.7 per cent). This last figure approximates to the very high average fatality rate of 63.6 per cent for type A botulism, which prevailed in the United States over the 50-year period 1899-1949, when 260 deaths occurred among 409 bacteriologically verified cases (13).

Now the case fatality rate in human botulism reflects many factors besides the toxigenic capacities of the incriminated cultures, regardless of whether these be types A, B or E (2). Moreover, it is not justifiable to assume that the

parenteral lethality for mice of a given filtrate or supernate should be closely related to its potential oral toxicity for man. (For example, type C cultures may display very high lethal potencies for mice, yet there is no definite recorded instance of type C human botulism.) But there remains to be explained the fact that deaths are liable to occur just about as quickly and effectively in type E as in type A botulism, despite the maximum potency of type E toxins, prepared under ordinary laboratory conditions, being around 3,000 to 5,000 mouse M.L.D. per ml., while the corresponding figure for type A toxins may exceed 1 million.

Several explanations for this inconsistency have been advanced, e.g., that type E strains might elaborate higher potencies of toxin in fish muscle under natural conditions than in the usual laboratory media. Actually, substantial amounts of toxin may be formed in dead fish inoculated with a toxigenic type E strain; but the titres developed were no higher than those obtainable in routine media (9, 5). Again, we failed to improve toxin production by using GPBI medium to which fish muscle was added in place of the usual ground meat (2). Nevertheless, media with special toxigenic propensities may be devised eventually.

Another suggestion was that type E toxin might be absorbed through the intestinal mucosa with particular readiness or rapidity (9). This view gained fallacious support from demonstrations that in monkeys, mice, guinea-pigs and goldfish, the ratio of oral : parenteral M.L.D. was lower for type E than for types A and B toxins (11).

A somewhat similar hypothesis postulated that type E toxins were especially stable in the presence of gastro-intestinal enzymes, so that *in vivo* a relatively high percentage was liable to be absorbed (9). But *in vitro* experiments in this laboratory, in which types A, B and E toxins were exposed to pepsin and trypsin at their respective optimal pH levels of 2.0 and 8.0, showed a comparable rate of decline in mouse lethality for all 3 toxins.

In 1953, in a brief description of type E mutational phenomena (11), reference was made to the "unusually potent toxin" sometimes produced by a mixed culture comprised of the toxigenic (TOX) and the non-toxigenic, proteolytic (TP) mutants. This finding has been confirmed repeatedly, using both small and large amounts of GPBI meat medium, inoculated with TOX and TP organisms of either homologous or heterologous strain origins. The results of a representative experiment of this kind are shown in Table II.

TABLE II—EFFECT OF TP MUTANT UPON TOXIN PRODUCTION BY "VH" STRAIN
Days of incubation

Cultural phase	4	8-18	47	60
TOX	300-1,000	1,000-3,000	1,000-3,000	300-1,000
TOX + TP	3,000-10,000	30,000-100,000	100,000-300,000	30,000-100,000

Potencies of toxin shown as mouse (parenteral) M.L.D. per ml.

About 250 ml. of medium were inoculated with the "VH" strain in its TOX phase, and a similar quantity was doubly inoculated with organisms in TOX and TP phases. After appropriate periods of incubation at 30° C., small samples of culture were withdrawn for toxin titration. During the 60-day period of observation, the TP organisms (completely atoxic when grown alone) brought about a 10-fold to 100-fold enhancement of mouse lethality through cultural association in common with TOX organisms.

Such results were at first erroneously explained in terms of proteolysis of the GPBI meat medium, induced by TP organisms in the mixture, which made available additional peptides and amino-acids for toxin synthesis by TOX organisms. Subsequent studies in this laboratory have indicated that the essential action of the proteolytic enzyme released from TP cultures is not upon medium constituents, but rather upon the type E toxin itself, which seems able to exist in two forms or states, provisionally termed "crude" and "activated".

The activation process may be achieved in other ways than that described above. For example, by growing TOX and TP organisms together for 7-9 days in the dialysate of a frequently replenished medium, a toxin may be procured whose potency is 1,000-fold that obtainable from the TOX organisms grown alone under the same conditions. Alternately, TOX and TP cultures may be grown separately and their sterile filtrates pooled. Depending on such variables as the composition of the medium, the amount of enzymes present, and the temperature at which the mixtures are held, there ensues a rapid and marked, or a slow and relatively slight, increase in potency. On one occasion, such a mixture of filtrates underwent a 10,000-fold increase in mouse lethality within 24 hours of incubation at 30° C.

An analogous mode of activating type E toxin was reported in 1955 by Sakaguchi (14). He isolated a type E strain of low toxigenicity (only 20 mouse M.L.D. per ml.) from gilthead-"izushi" implicated in a Japanese outbreak of botulism with fatalities. Extracts of the emulsified izushi showed considerably higher potency. Moreover, the pure type E strain yielded filtrates 100-fold more potent when grown together with a proteolytic contaminant of the genus *Clostridium*, also isolated from the izushi. Whether or not this "contaminant" was in fact a naturally occurring TP mutant of the toxigenic type E strain is debatable. In any event, there seems no reason to doubt that type E toxin may become "activated", under field as well as laboratory conditions, in the presence of suitable bacterial proteolytic enzymes.

Certain non-bacterial enzymes may act likewise upon type E toxin. Marked and rapid activation of this toxin by treatment with trypsin at a pH around 6.0, well below the optimal range for that enzyme, has been reported recently by Duff *et al.* (15). When crude type E toxins were incubated for 45 minutes at 37° C. with 1 per cent trypsin, their mouse lethalties increased nearly 50-fold. We have confirmed and extended these findings, and obtained much higher "activation ratios". In one experiment, a filtrate of the Japanese strain "Iwanai", after 4 hours incubation at 37° C. with 1 per cent trypsin (Difco 1:250) at an initial pH 5.5, attained a titre of $5-10 \times 10^7$ mouse M.L.D. per ml. As the initial titre was $1.5-2.5 \times 10^3$, the activation ratio in this instance was

roughly 40,000. Parallel titrations of toxin similarly treated, but with the initial pH adjusted to 7.5, showed a rapid loss of potency. Pepsin failed to activate type E toxin at either pH 2.0 or 5.5. These and other relevant findings will be recorded elsewhere in greater detail.

The evidence accumulates that type E toxin is convertible by certain proteolytic enzymes, under narrowly specific sets of circumstances, into an activated form having a greatly multiplied killing power for mice. Assuming that man is as susceptible as mice (and rabbits) to the activated toxin, no further explanations need be sought for the paradox outlined at the beginning of this section. The joint proliferation in a foodstuff such as raw fish of a toxigenic strain and of its TP mutant, or even of a suitably proteolytic contaminant, could result in the elaboration *in situ* of the high-titre activated toxin. Hence, a consumer of such material might ingest toxin of far higher potency than would be anticipated from growth of the TOX strain in ordinary laboratory media. In default of such a conjunction of factors, activation may well occur *in vivo*, as Duff *et al.* (15) have suggested. The ingestion of even moderate amounts of crude type E toxin inevitably entails exposure to trypsin of whatever remnants survive absorption from, or destruction in, the stomach. Just beyond the pyloric valve, the pH of the mixture of gastric contents and jejunal secretions must often be within the pH range 5.5-6.5, which favours tryptic activation of type E toxin. It follows that the fate of an individual exposed to a type E botulinic hazard will be governed not only by the actual amount of toxin ingested, but also by the fluctuations in pH of his gastro-intestinal contents at the crucial time.

EPIDEMIOLOGICAL AND ECOLOGICAL PECULIARITIES OF TYPE E BOTULISM

Of 32 known outbreaks of type E human botulism, 27 have occurred in regions bordering, or draining into, the Northern Pacific Ocean and contiguous waters; and it is remarkable that in all but one of the total the vehicle was raw or improperly cooked fish, fish products, or marine mammal. In Japan, a heavy fish-eating country, no fewer than 20 of these episodes were identified over a 5-year period, May 1951 to August 1956, of which 13 occurred in the least populated and most northerly island of Hokkaido. There have also been 4 outbreaks in British Columbia, 2 in Alaska, and 1 in California. The Japanese and British Columbian episodes were all due to various species of raw fish or fish products, while beluga (white whale) was responsible for those in Alaska, one of which has not yet been mentioned in the literature.

In August 1956, an Eskimo mother and her 2 children were hospitalized at Anchorage, Alaska, with symptoms of botulism following consumption of beluga "muktuk". The mother died, a 6-year-old girl was extremely ill but recovered, while a 10-year-old boy had only a minor illness (16). A mildly toxigenic strain was isolated from the implicated food by Drs. K. F. Meyer and B. Eddie of the Hooper Foundation for Medical Research, University of California.

Of the 5 occurrences of type E botulism outside the northern Pacific perimeter, 2 were in New York State, 1 in Leningrad, U.S.S.R., 1 in Denmark,

and 1 in Labrador. Of these, the last-named has not been recorded previously. In December 1956, a group of 8 Eskimos became ill and 6 of them died near Nain, Labrador, after eating seal flipper which had been stored in a petroleum can. Through the kindness of Dr. J. E. Josephson, Director of Laboratories, Newfoundland, we received a deep-frozen specimen of flipper taken from this can. After thawing, portions of the seal were minced and extracted with saline. The presence of at least 600 mouse M.L.D. of type E toxin per gram of the minced flipper was thus demonstrated. A strain of *Cl. botulinum* type E was isolated in TOX phase from several portions of the mince, which produced toxin in the GPBI meat medium of the customary order of potency, viz., 1,000 to 3,000 M.L.D. per ml. Further consideration of these latest botulinic episodes in the Far North, and their bearing on the nutritional habits of the Eskimo and other Arctic dwellers, must be reserved for a subsequent report.

There is a natural impulse to correlate the peculiar geographic distribution of type E botulism with the predilection of these organisms for fish and marine mammals as vehicles. When this correlation was attempted 4 years ago (2), the first report of a type E outbreak in Japan had only just appeared, and 7 of the 10 known outbreaks had occurred in North America. Without retracting the hypothesis then put forward, "that type E spores are widespread, at least in the northern hemisphere", it now seems necessary to amplify the postulated "especially heavy dissemination in the soils and waters of certain parts of North America, and probably of the U.S.S.R.". At present, the centre of highest incidence of type E botulism in the world appears to be Japan, more particularly the coastal areas of Hokkaido. This fact can be linked logically to the fondness of the inhabitants for raw fish, and to the prevalence of type E spores in locally collected samples of lake-side sludge, coastal sand and fish intestines (5).

The region of second highest incidence of type E botulism is currently the North-West Pacific Coast, more specifically British Columbia and Alaska. Relative to population density, the incidence in this region vies with that in Japan. While no intensive bacteriological studies of soil and sea mud samples from this coast have been made as yet, it is noteworthy that the first type E strain isolated from soil was collected at the port of Nanaimo, B.C. (4), and that recently the presence of type E organisms has been demonstrated by us in samples of mud dredged from the bottom of British Columbian coastal inlets. Perhaps it is justifiable to speculate that the connection between these regions of maximum incidence is the cold ocean current, travelling westward across the Pacific from the Japan and Okhotsk Seas, and skirting the Alaskan and British Columbian coasts. Type E spores washed from coastal soils into the ocean depths could be passively conveyed for long distances by this current, or by bottom-feeding fish.

DISCUSSION

In nature, type E strains of *Cl. botulinum* presumably occur mainly in the OS phase. As such organisms are non-toxigenic, and differ in many other respects from the toxigenic (TOX) form, they may be overlooked, or dismissed

as "contaminants", in routine soil or food surveys, and even in the examination of suspected foodstuffs. Methods of differentiating these organisms, e.g., by carbohydrate-fermenting or agglutinogenic reactions, would help to establish their actual prevalence. Incidentally, the long-held belief that cultures of *Cl. botulinum* (types A and B) were nearly always inseparably associated with other species of Clostridia, in particular with *Cl. sporogenes*, is almost certainly traceable to their ready reversion to the OS phase.

Only one other point will be raised for comment here. Duff *et al.* (15) state that their untreated and trypsin-treated toxins were both neutralized by the same type E antitoxin. Preliminary quantitative experiments in this laboratory suggest that activation of a type E toxin causes no significant change in antitoxin-combining power. Verification of these findings would increase the desirability of developing an *in vitro* method (e.g., flocculation) for assaying type E toxins and antitoxins. Alternatively, if this should prove impracticable, it would become essential to use only standardized toxins for *in vivo* titrations. Since activated preparations seem quite unstable, as judged by their mouse lethality, even when stored in the refrigerator, the relatively far greater stability, under these conditions, of crude toxins prepared from purely TOX cultures would be a paramount advantage for assay purposes.

SUMMARY

1. About 100 type E strains of *Cl. botulinum* have been isolated in various countries. Roughly one-half of these strains have been subjected to intensive study of their distinctive cultural, biochemical and toxigenic properties.

2. Toxigenic (TOX) type E strains tend to become atoxic because they readily degenerate into an opaque and sporulating (OS) colonial mutant, or less often into a transparent and proteolytic (TP) mutant. These mutants, whether cultured alone or together, are incapable of toxin production; but either of them may revert to the TOX phase.

3. If TOX and TP mutants are grown in the same medium, or their filtrates are pooled, the toxic potency is markedly increased in terms of mouse lethality.

4. Type E toxins can be "activated" by incubation for a few hours at 37° C. with 1 per cent trypsin at about pH 6.0, so that their mouse lethality may increase up to 10,000-fold or more. Preliminary tests suggest that the antitoxin-binding power of such activated toxins is not markedly affected.

5. The paradoxically high average fatality rate in human type E botulism has been interpreted in the light of these toxin-activating phenomena.

6. To date, 32 outbreaks of type E botulism have been recorded, involving a total of 145 persons, with 56 deaths, i.e., a case fatality rate of 38.6 per cent. Of the 27 outbreaks which have occurred in regions bordering the North Pacific Ocean, 20 were in Japan, 4 in British Columbia, 2 in Alaska, and 1 in California.

7. A brief account is given of previously unreported occurrences in Alaska and Labrador, both involving Eskimos, in which the incriminated foods were beluga and seal flipper, respectively.

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The Problem of the Aged¹

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THE problem of the aged has assumed an ever-increasing importance to us, not only as physicians, but also as citizens. To most of us, the approach of the declining years is a source of deep concern, if not apprehension. The subject is also of particular interest to psychiatrists because of the frequency of aberrant behaviour patterns in the majority of so-called "aged people".

I would start by making a postulate, which is indeed a fact, that the number of aged people, both absolute and relative to the rest of the population, is steadily increasing. It is surely prudent, if not indeed mandatory, for us to examine this rising tide before flood levels are reached. If we make no provision for this steadily increasing group, then Browning's words: "Grow old along with me, the best is yet to be—the last of life for which the first was made," would be a mere mockery. Let us then, each of us, attempt to put forward suggestions for planning which are appropriate to our own speciality and interest.

What do we mean by old age? Officially and administratively, old age in this country is 65, because this is the age when many are compulsorily retired. There is, however, a considerable gap between official old age and that of natural onset, bearing in mind that natural old age is the time when physical and mental dependence become so pronounced that there is a marked limitation of both mental and physical activity. It is generally considered that there is a period of five to ten years between the official and natural onset of old age. It is obviously of great importance that we should make provision for this period, in helping those people who are forced to retire to lead an active and productive life within the limits of their capacity.

One cannot well consider the onset of old age without making some mention of contributing factors. Generally, we begin to show signs of age at about 60, but are not likely to be dependent upon others until after 70, when our powers, both physical and mental, markedly begin to fail. This is too often looked upon as a disease process, and one for which little or nothing can be done. I would submit at once that this is an incorrect attitude. I do not think that this should be regarded as a disease process. It is more in the nature of a normal physiological process, and as natural as growth and development. Dr. I. D. Grant, a general practitioner of Glasgow, in a paper presented before the Canadian Medical Association last year, stated that "the essential change is a wastage of tissue which is either not repaired at all, or is replaced by another and less useful tissue—muscle fibres being replaced by fat or fibrous tissue. The brain diminishes somewhat in size and contains less fat and more fluid . . . nerve cells

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and neurons atrophy, the myocardium undergoes fatty and fibrotic degeneration." (1) I shall not enumerate the many other changes that occur and which result in a gradual failure of function until, finally, we become wholly dependent and are compelled to make preparations for the final journey across the Stygian tide.

What then, of all this talk about the prevention of senility or old age? If this indeed is a natural and inevitable process in the life of man, it would appear that our obvious goal is not to prevent old age, but rather to help the aged to accept and enjoy the autumn and winter of life by making provision for an adequate social and clinical program. We have every reason to believe that we can delay the onset of feebleness and senility and indeed this has already been accomplished, which accounts in large part for the magnitude of the problem with which we are faced. Barring death by violence, most people can expect to live the time set forth in Holy Writ: "the days of our years are three score years and ten: and if by reason of strength they be four score years, then is their strength labour and sorrow". It is just these years of labour and sorrow with which we are concerned, to make them years of contentment and quietude.

At the beginning of this paper, I stated that the number of the aged, both absolute and relative, is steadily increasing. The question may be asked, to what extent? According to Dr. Robert Kohn of the Dominion Bureau of Statistics, the number of persons of 65 and over increased from a quarter of a million in 1921 to over one million in 1951. Even in the ten-year period from 1941 to 1951 the number rose by over 300,000. They also form a greater proportion of the total population. In 1901 they accounted for 5 per cent of the population of Canada; in 1951 they accounted for almost 8 per cent of the population.

In a paper presented to this Association last year by Dr. M. R. Roth of Saskatchewan, it was stated that while our total population increased by 21 per cent in seven years, the number of persons over 65 increased by 28 per cent and this occurred in an era when our birth-rate was at a very high level.

Now what is happening to large numbers of this increasing aged population?

It is a fact that the aged are flowing into mental hospitals in ever-increasing numbers. The number admitted to mental hospitals is increasing much faster than their number in the general population, and it is feared that many old people are sent to mental hospitals because other facilities do not exist. Such a procedure is in the nature of slow liquidation and suggests gross neglect on the part of some persons or organizations.

There are two points of view regarding this ever-increasing tide of aged people flowing into our mental hospitals. One point of view holds that only a negligible number of aged in mental hospitals could be cared for elsewhere. The other says that the mental hospitalization of the aged is being overdone. Let us briefly examine these two divergent views.

In 1940, in the State of Connecticut, the Commission on the Treatment and Care of People Afflicted With Physical and Mental Disabilities (2) stated: "There are many hundreds of persons, mostly aged, who are now patients in the hospitals for the insane who do not require the specialized psychiatric care

provided by such hospitals." Indeed, it has long been held that crowding in our mental hospitals is due to the large number of aged patients who do not need care and treatment in psychiatric institutions. They could be transferred to homes for the aged or be cared for by some other facilities in their own community.

A very careful study as to the validity of this thesis was carried out at three Connecticut State Hospitals by Shindell and Cornfield. These workers came up with the finding that "the number of aged in mental hospitals who can be cared for elsewhere is a small percentage (6.5 per cent) of which over half (3.5 per cent) have already been removed". This is, indeed, very surprising. Although the facts and figures of their survey cannot be doubted, they say little about the age and condition of patients on admission, and nothing about treatment program, including social and work activities within the hospital. Neither do they make any mention as to whether or not the patients under review were receiving visits by relatives or other people whom the aged persons might expect to take some interest in their welfare. It is more than probable that they were placed in the mental hospital and forgotten. It is well known that in the absence of a suitable treatment program and a program of therapeutic activities, an elderly patient on admission to a mental hospital will rapidly deteriorate. Idleness is the greatest scourge of old people, and loneliness is a burden beyond their endurance. Both of these are all too common in our mental hospitals, and are often the last straw for the aged person. Hope disappears, and with it all interest in themselves and others. In my personal experience, I have seen this to be the fate of many of our older citizens.

I have here to state that I personally subscribe to the second point of view; that is, that too many of our aged citizens are being admitted to the mental hospitals, and that this in fact is not only unnecessary, but is more likely to be the result of man's inhumanity to man. What is the justification for holding such an opinion? Dr. Laurence Kolb of Washington, in a paper read before the American Psychiatric Association last year, described an attempt to obtain an authoritative opinion on the use or abuse of mental hospitals by aged people. (3) A questionnaire was sent to 80 authorities in the mental hospital field and 54 replies were received. From the answers there was authoritative information that mental hospitals are being burdened by an increasing number of old people who should be cared for elsewhere. It would also appear that "they are sent to mental hospitals because no relative is willing to care for them, and there is no other place for them to go". (3)

In the United States, during the period 1936 to 1951, the rate of admissions to mental hospitals of patients over 65 with diseases of the senium increased by 100 per cent. It should further be noted that in 1951 the admission rate for this age-group was three times that for all ages. With reference to these figures, it is most significant that in the United States from 1936 to 1951, the persons 65 and over in the population increased by only 54 per cent but the admissions to mental hospitals of these persons 65 and over increased by 100 per cent. There is no evidence to support the view that this increase was due to a higher incidence of psychoses in the aged person, although this is in

the realm of possibility. It is more likely to be the result of changed sociological and cultural factors.

These figures would certainly support the thesis that there is a frightening trend of our old folks drifting to mental hospitals who are not suffering from anything except feebleness and some loss of mental function. Economic poverty is also a matter of grave significance, and no doubt a causal factor in this increased admission rate of our older citizens to mental hospitals.

Still further support to the thesis that elderly people are being unnecessarily committed to mental hospitals is given by a recent survey of the patient population in one of our mental institutions in New Brunswick. In this survey of patients over the age of 65 years it was found that we had a total of 320 patients. The survey, first of all, eliminated from this number those patients who were admitted before they had reached their sixtieth birthday. This left 116 who were 65 or over on their first admission. The patients making up this list of 116 were divided into three groups:

(1) Those definitely dischargeable—in no need of psychiatric hospitalization.

(2) Those about whom there was some doubt because their behaviour was aberrant to the extent that it might interfere with satisfactory adjustment in the community, depending upon the type and character of their involvement.

(3) Those definitely not dischargeable due to their mental symptoms being of the kind which would preclude adjustment in any normal environment.

This survey revealed that there were 58 in the first group, 20 in the second group, and 38 in the third group. This means that out of a total of 116 patients who were surveyed as to their dischargeability, there were 78 for whom there was little or no need for hospitalization, leaving only 38 who needed psychiatric care and treatment in an institution. In the light of the figures published by Shindell and Cornfield, this is a very surprising finding—surprising in that Shindell and Cornfield found that only 6.5 per cent could possibly be looked after adequately outside of a mental hospital, whereas our own findings were definite in suggesting that 67.2 per cent of those who were admitted at 65 years of age and over could well be looked after in the community.

WHAT CAN BE DONE?

First of all, I would submit that no adequate study has been made which would allow us to launch forth on a comprehensive program of action in dealing with the problem of the aged. Little or no attention has been given to this problem in the past in medical and sociological research. I do believe, however, that enough is known about old people—their child-like joys and poignant sorrows, and their deep and heart-felt needs—to state dogmatically that caretaker policy of providing sufficient institutions and homes for the aged is not the answer. Old people are human beings as you and I. What does it mean to these old people to be forced into our institutions and especially our overcrowded and understaffed mental hospitals—those houses of strident shadows where men and women are immersed in idleness and loneliness? No

doubt many of you have oft-times heard them say "I'd rather die than go to the Home!"

No, even if there were a possibility of providing the place and services required, there would still remain the problem of getting the old people to use them unless we resort to drastic measures and have them certified. This is most undesirable, but there is evidence that this is already too often resorted to. It must be remembered that old age is no solvent of individual wishes and desires and of obstinacies. No, the burden is and must remain essentially a domestic one.

There are three main objectives which require attention in accordance with the thesis of Dr. J. H. Sheldon of the Royal Hospital, Wolverhampton (4), who states: "(1) We must endeavour to preserve the independence of old people as long as possible, so as to stave off the day when they become a burden to others. (2) We must do everything possible to assist the family in the care of its aged dependants, without at the same time relieving it of the necessity for still taking an interest in the matter. (3) We must ensure that all those old people who are willing to contribute to the total national effort are enabled to do so."

With regard to preserving their independence, you must understand that all old people should be encouraged to play an active part in life. They all treasure their independence and will not relinquish it until forced to do so. But how can we preserve this independence in the face of the physical infirmity of the aged? This is not the place to discuss therapeutics, but I would refer you to the work of such pioneers in this field as Dr. Cosin and Dr. Margaret Warren who hold that so much can be done. It is true that a large part of what these pioneers recommend comes under the heading of physiotherapy and rehabilitation which are largely hospital programs, but we must find some way to bridge the present gap between hospital and home care. There should be some special kind of old age service to do this. It is not a new concept, and such a service would cost less than the full care of the old person in an institution or hospital bed. In these pioneer schemes, the names of Dr. E. M. Bluestone of America and of Dr. E. B. Brooke of the United Kingdom are of profound importance in our future planning. The main feature in these pioneer schemes is that there is a special old age service co-ordinated by a committee on which all community resources are represented. In these pioneer schemes very, very few cases are admitted to hospitals or institutions. Where hospital treatment is necessary, every endeavour is made to provide this on an out-patient basis.

I have already stated that the main burden must be a domestic one. This, of course, involves the family and it is extremely important that we should have a deeper understanding than we now possess of those factors which facilitate or hinder the development and maintenance of the family spirit and responsibility. We know little about this, but it is crucial if we are sincere in our desire to keep our old people from being disposed of in the county homes and mental hospitals. It is, of course, self-evident that if we look forward with any realism to expecting the family to participate in the care of the aged, then we must provide some domestic assistance to the family. For example, arrange-

ments for the care of the aged relative must be made to allow the younger generation to get a yearly holiday which is so urgently needed.

I can only mention very briefly the matter of helping our old folks to contribute to the national effort. It would seem that the solution to this problem lies pretty much in the hands of the economists, industrialists and administrators. But it is certainly of prodigious importance. It is most important in this connection, that I draw your attention to the fact that as the proportion of old people to those of working age rises from, let us say, one in six to one in four, or even one in three, if all the old sit back on their first pensionable birthday and draw a pension with which they compete for consumer goods made by a decreasing section of the population, it is most likely, and indeed inevitable, that our standard of living will be endangered. This point was much emphasized by the Royal Commission on Population carried out in the United Kingdom in 1949. Apart altogether from its future economic importance, it is almost self-evident that a busy, rather than an aimless, life is an ideal prescription for old age. And how familiar we are with the sight of the man who retires from a busy occupation, to die in a year or two of boredom. I realize that there are many difficulties in finding employment for the aged man, but I think with time and study devoted to this problem, that much could be accomplished.

I would hope that what I have said may bring into focus the fact that a large proportion of our aged population are being disposed of in institutions, county homes, and mental hospitals. This results in increasing hardship and pain for this group, and is, in many cases, only resorted to as an expedient.

As the number of old people increases, so will it become more and more urgent that they have as active a part in our society as possible. To this end, it is necessary to provide a special service for old people the main aim of which will be to preserve their independence for as long as possible. As old people become really aged, and unable to maintain their own care, so will they have to pass into the care of the family. If the family is to sustain the burden, assistance from the community will be necessary. Our primary function must be to curtail incapacity rather than to add longevity. Our motto should be "to add life to years rather than years to life".

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The Control of Mastitis*

A SYMPOSIUM

SOME ASPECTS OF THE AETIOLOGY AND CONTROL OF BOVINE MASTITIS

D. A. BARNUM,¹ D.V.M., D.V.Sc., D.V.P.H.

THERE is a great tendency to discuss mastitis as one disease. In strictly pathological terms there is a certain basis for this conception and certain factors, such as the milking machine, heredity and production, are common contributors to its initiation and development. However, on bacteriological and epizootiological grounds there is no justification for this consideration. Mastitis may be classified as contagious, sporadic and non-specific.

Streptococcus agalactiae continues to be a major cause of the disease. As no strains of *Str. agalactiae* have been found resistant to penicillin, removal of the organism from the gland by treatment is the major weapon in control of disease. Recent work has demonstrated that animals vaccinated with formalized cultures of *Str. agalactiae* became free of infection more readily than controls. Investigations on the pathogenesis of this organism have shown that milk contains no inhibitory substance to *Str. agalactiae*, that quarters may be infected with relatively small numbers of organisms, and that variation in infectivity results when organisms are placed in the lower third of the streak canal.

Micrococcus pyogenes. A rise in the number of infections due to this organism has been reported. Part of this increase is due to the failure of antibiotics to eliminate the organism from infected quarters and to the subsequent spread to healthy animals by contaminated dairy equipment. The spread of *M. pyogenes* can only be prevented by strict adherence to procedures as formulated by the Ontario Veterinary College. The failure of antibiotics to eliminate the organism in over 50% of cases treated is not the result of resistant strains. Only 38 of 437 strains (8.7%) tested in Ontario in the years 1954-1955 were found resistant to penicillin. Immunization against staphylococcal mastitis is under study by some investigators. Preliminary findings indicate that the use of formalized killed cultures and toxoids serves to prevent infection in fewer quarters when compared to non-immunized controls. Immunization does not alter the condition of the chronically infected quarter.

A large number of organisms have been associated with herd outbreaks

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and sporadic cases. *Pasteurella multocida*, species of *Pseudomonas*, yeasts and more recently *Nocardia* have been associated with mastitis. Many of these infections will not respond to antibiotic treatment.

Records of mastitis laboratories show that 10 to 15% of the samples from acute cases of mastitis fail to yield pathogenic micro-organisms on culture. There is no evidence that a virus or a PPLO is involved. Some workers have suggested that factors such as hormones, incomplete milking and udder irritation would result in an increased permeability of the secretory cells.

Attention has been recently directed to the possibility of the mammary gland serving as a site of antibody production against bacteria or viruses. It is postulated that an immune state may be developed against mastitis pathogens by the introduction of antigens into the gland. Additional investigations are required in this field.

THE RELATIONSHIP OF THE MILKING MACHINE TO MASTITIS

RICHARD S. GUTHRIE, D.V.M.¹

THE last phase of agriculture to be mechanized was milk production on the farm. This was accomplished by the mechanical milking machine which harvested the milk crop. The machine was expected to operate with a minimum amount of attention while attached to the udder, and when removing the milk was taking the place of or duplicating an act of nature, the nursing calf. This operation was to be done rapidly and without injury to the teats. Because of the lack of knowledge relative to sanitation and correct milking practices in the early days, milking machines became most unpopular. Milk of extremely poor quality from the standpoint of bacterial counts, flavour and keeping qualities was produced. Many dairy herds were ruined because of the high incidence and rapid spread of mastitis. Consumer acceptance reached an all-time low. Health department representatives, veterinarians, and members of the industry, realizing the importance of mechanical milkers as labour savers on the farms, pooled their knowledge and ideas. Today, the equipment is vastly improved from a manufacturing and sanitation standpoint. Stainless metal is used in the milk zone and the rubber parts are constructed of materials that are non-toxic and are able, generally, to withstand exposure to present-day detergents and sanitizers.

A milking machine that is in poor mechanical condition, poor sanitary condition, and incorrectly operated, constitutes one of the chief predisposing causes of mastitis. The teatcup, which is that part of a milking machine coming in direct contact with the cow, merits close attention. Infections tend to increase in length and diameter after long periods of continuous usage and improper care. Resiliency is greatly reduced, resulting in a slower milking rate and incomplete milking. Such infections are also insanitary, as shown by the work of Claydon, Kansas State. Even though infections were correctly washed and sanitized, he demonstrated that organisms were present in the pores of such old and used infections, and tended to defy surface cleaning and sanitizing. Irritation of the teat ends may also be produced by such conditions. Infections

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of different ages used in the same cluster of teatcups will result in a different rate of milking per quarter. Excessive vacuum resulting from vacuum line stoppage, an improperly located vacuum regulator, an over-sized pump with a regulator that is too small tends to produce teat injury as evidenced by reddish or bluish coloured ends that persist for hours after milking. Faulty, dirty, or worn pulsator pistons may cause injury to the teats by subjecting them to improper dilation and collapse of the inflations, a function that is so necessary for restoring the blood circulation in the teats. A similar condition can be caused by small holes in the short airtubes attached to the shell and this is often observed. Milk-block is a condition observed in an occasional milker unit and is characterized by an accumulation of a volume of milk around the teats in the claw portion of the machine. This results in bathing the teats with milk, causing slow milking and permitting possible exposure of teat ends of healthy quarters to mastitic organisms. The admission of a minute quantity of air into the claw area is sufficient to prevent this condition.

Proper care of a unit includes prompt rinsing with a pail of tepid water immediately after use, disassembly and bristle brushing of the component parts with a balanced detergent solution, rinsing, correct storage, and sanitizing just prior to use. Two sets of inflations should be used and rotated weekly, with the used set boiled in a solution of lye (2 heaping teaspoonfuls of lye per quart of water) for 15 minutes and allowed to soak in this same solution as it cools for a minimum of eight hours. An enamelware container is desirable for this purpose. Such a practice aids in eliminating the rubber parts as a source of mastitic organisms and promotes milking efficiency. The milking machine should be correctly installed and be operating perfectly from a mechanical standpoint. The units should be kept in a clean and sanitary condition at all times. Particular attention should always be given to the component parts of the milker system: the vacuum pump, possible plugged vacuum lines, line leakage, malfunctioning vacuum regulators, dirty or worn pulsators, and badly worn, fat-filled, or misshapen inflations. The manufacturer's directions should be followed carefully. Good service that is readily obtainable is desirable and should be insisted upon. A milking machine is no better than the man who operates it. The manner in which a cow is milked, together with her inherent capacity, determines how much milk she produces, how rapidly she milks out, how well the production level holds up, and the state of udder health.

MANAGED MILKING PROGRAM

A most valuable contribution resulted from studies which brought about the present-day managed milking or correct milking program. Dairy men who follow this program when milking their herds generally have succeeded in keeping the incidence of mastitis down to a minimum with increased production of a higher quality product. Before initiating a managed milking program, which in itself is practising prevention, the herd should be given a physical examination of the udders by a competent veterinarian. Cows would, as a result, be placed in either healthy, suspicious, or diseased classifications. The cows should always be milked in this order, starting with the healthy group. It is desirable to clean thoroughly and disinfect the stable platform and use

new, clean, dry bedding prior to realigning the cows. Good environmental sanitation should always be the order of the day. All predisposing causes of mastitis should be removed insofar as possible.

The steps of a managed milking program are listed briefly as follows:

1. Sanitize the equipment immediately prior to use with an acceptable sanitizing solution.
2. Using an individual towel wrung out of a sanitizing solution at 130° F., massage the udder for 30 to 60 seconds to clean it and stimulate the milk let-down.
3. Use a stripcup or strip-plate on every cow at every milking. Milk last any cow that demonstrates abnormal secretion, and carefully disinfect the hands and strip-plate following the detection of such an animal.
4. Attach milker unit within ONE minute after preparation of udder.
5. When the normal flow of milk has ceased, machine-strip the cow and remove the teat-cups, taking care to break the vacuum, in order to reduce the danger of irritating teat ends.
6. Prior to attaching the unit to the next cow first dip teatcups into a bucket of tepid water in order to rinse out the milk film, then dip cluster into a bucket of sanitizing solution. Leave the milk valve open to prevent air block in the teatcup cluster.
7. Dip cow's teats after milking with a sanitizing solution or a 2% soluble pine oil solution. This step rinses the milk from the teat end and thus discourages flies and bacterial growth.

It is possible to keep the incidence of mastitis in the dairy herd down to a minimum while using a mechanical milker. A managed milking program, together with the use of equipment that is in the best possible mechanical and sanitary condition, aids in making this a reality. Continual vigilance is necessary in order to detect and correct any undesirable condition that may develop after continued use of the milking equipment because of neglect, wear, or lack of service.

RAPID TESTS AND THE LABORATORY IN A MASTITIS CONTROL PROGRAM

S. D. JOHNSON, D.V.M.¹

BOVINE mastitis is a universal disease. Early investigators of mastitis in Europe described *Streptococcus agalactiae* as an important infectious agent often associated with clinical flare-ups. In 1935, successful experimental transmission of infection to healthy udders from slight teat wounds, was described by Bendixen (1).

Because New York States dairymen were suffering heavy losses from mastitis, state legislation, through efforts of farm organizations, provided the funds for a study of the disease. In 1929, with the aid of these funds, Dr. Udall (2), Professor of Veterinary Medicine at Cornell University, began investigations from which a plan for the prevention and control of mastitis was developed. Repeated examinations of dairy cattle in commercial herds near Ithaca provided the opportunity for comparison of findings in the stable and laboratory. Today, several of the diagnostic tests and examinations employed during those trial periods are used by the New York State Mastitis Control Program, now in its eleventh year of operation.

The diagnosis of mastitis in the stable may include several examinations and

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tests of the udders and milk. They are: the physical examination of the udder, the black strip plate examination of milk, the bromthymol blue test of the milk with the solution or blotter and the Whiteside test.

The physical examination of the udder reveals the degree of fibrosis and extent of secretory tissue damage. The udders can be classified as essentially healthy, mildly infected, or badly diseased. The black strip plate will identify quarters giving off-colored milk, flakes, clots, or pus. For the dairyman, its routine use before milking each cow, detects flare-ups early. When the pH of milk is changed toward the alkaline range, the bromthymol blue test shows an increased green color. A green color usually indicates an irritation of the quarter from infection or injury. A secretion with a negative or yellowish reaction may show infection.

The rapid field chlorine test described by Hayden (3) may be used on lactating cows to detect fibrotic and suspiciously infected quarters. While the test was never widely used, a milk sample with 0.14% or more chlorine turned to a yellow color.

The fore-milk quarter samples are refrigerated at the stable. In the laboratory, 0.01 cc. of each sample is streaked on 5% blood agar medium. The plates are incubated at 37½° C. at 24- and 48-hour intervals. Besides streptococci, the plates will identify hemolytic and non-hemolytic staphylococci, coliform and other enteric organisms and corynebacterium pyogenes. Streptococci colonies are picked from positive cultures, for examination by the Camp test (4). Camp blood agar plates differentiate *Streptococcus agalactiae* from other types of streptococci—a rapid and efficient method for identification of *Streptococcus agalactiae*. The Hotis test (5) may detect 94.86% of the quarters infected with *Streptococcus agalactiae*. Cultural methods give a higher efficiency. The microscopic examination of incubated milk will show various types of bacteria, both udder pathogens and contaminants. The true identification of these bacteria requires differential media cultures.

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THE PLACE OF DISINFECTANTS IN MASTITIS CONTROL

F. H. S. NEWBOULD, B.S.A.

THE thesis that micro-organisms are a natural part of the cow's surroundings and that they form a "normal" flora in her udder, disregards the plain fact that the modern milk cow is born, raised, fed, milked and now inseminated under the most unnatural and highly artificial conditions man can devise. It is generally recognized that mastitis organisms gain entrance to the

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udder through the teat sphincter and streak canal, and it has been shown by many investigators (1) that suction created during the milking process, either by hand or by machine, is the principal factor involved in the passage of micro-organisms through this route. It is, therefore, obvious that if large numbers of micro-organisms are permitted to come in contact with the teat sphincter during the milking process some are more than likely to gain entrance to the udder.

Milking by machine brings the teatcup liner in intimate contact with the teat surface, and provides maximum opportunity for exchange of micro-organisms between the two. Micro-organisms washed from the liner will contaminate the milk film left on the teat skin and teat orifice after removal of the machine. This film partially dries, builds up from milking to milking and provides ideal conditions for bacterial multiplication.

The role of disinfectants in mastitis control can be simply stated. To prevent the spread of potential pathogens from cow to cow, and to remove, kill or prevent multiplication of those organisms which inadvertently find their way to the proximity of the teat orifice. That such control is practicable is borne out by the reports of Murnane (2), Hughes (3), Wilson (4), Simon and Hall (5) and Oliver, Dodd and Neave (6). Oliver, Dodd and Neave reduced very significantly the incidence of *Staphylococcus aureus* infections in the dry period by washing the udder after the last milking in the lactation period, and dipping the teats in 5% tincture of iodine.

At the Ontario Veterinary College we have had success with a number of herds which previously had been extreme problems. We have been able to prevent the spread of *Staph. aureus*, prevent spread and eliminate *Pseudomonas aeruginosa* in farm herds, and completely eliminate *Staph. aureus*, *Str. agalactiae* and other miscellaneous organisms from a small experimental herd in our own barn. This has been accomplished by treatment combined with disinfection aimed at the specific organisms involved.

It is not proposed that disinfection is the great panacea for controlling mastitis, but that it has a most important place. Without it, in many instances, treatment with chemicals or antibiotics is useless, as reinfection soon occurs. Where large numbers of micro-organisms accumulate around the teat sphincter some will find their way into the udder, and in a large percentage of such occurrences infection will result.

The means of using disinfectants most effectively has not yet been determined but there can be no doubt that there is a place for them in mastitis control.

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KNOW YOUR ASSOCIATION—ITS WORK

THE purpose of the Canadian Public Health Association is the conservation and improvement of health throughout Canada. It brings together all who are professionally engaged in public health—physicians, dentists, nurses, sanitarians, veterinarians, engineers and interested laymen. The Association is concerned, primarily, with those health services which are provided on a community basis and which are essential to the health of all citizens. As the professional society, the Association speaks for all who are engaged in public health service. As the professional society, it is able to make a fundamental contribution to the improvement of health services by establishing qualifications for various offices, the provision of training and the study of salaries and other factors relating to appointments. A major contribution is made to this objective through the publishing of the Canadian Journal of Public Health which is designed to serve as an educational medium and for the presenting of programs and the recording of health developments in Canada.

Throughout the years, the annual meeting of the Association has provided a national conference affording the opportunity for the development of a Canadian consciousness in health matters. The value of annual conferences, both national and provincial, cannot be over-estimated in reviewing the progress made and in discussing common problems. During the past few years the Association has assisted in the efforts of the provincial departments of health in recruiting professionally trained personnel and through the Journal, a helpful service has been rendered in publishing the information concerning available personnel and current needs.

The Association has conducted a number of studies of public health problems. These have been undertaken by committees, assisted by consultants. In 1941, the Association contributed to the special efforts in several of the provinces to have legislation enacted requiring pasteurization of all milk offered for sale by publishing a series of papers on milk sanitation and issuing a pamphlet of sixty pages, entitled "Safe Milk". Subsequently, the Association prepared a standard milk ordinance which formed the basis of milk control measures in many communities. In 1946, the Association appointed a committee to report on qualifications and salaries of public health personnel. The

first report was presented in that year, a second report was published in 1949 and a third report in 1951. During the past year the committee has reviewed the situation and a fourth report will be submitted shortly. In 1943, the Canadian Public Health Association had the privilege of presenting its views on national health insurance to the Special Committee on Social Security of the House of Commons. A brief, entitled "The Importance of Preventive Medicine and Public Health in National Health Insurance", presented the considered opinions of the Association on this important subject. A committee is engaged now in reviewing this brief for presentation again to the Association for endorsement. In 1950, the Association issued a report of a study committee on public health practice in Canada conducted by Dr. J. H. Baillie and Miss Lyle Creelman. This extensive study of the work of public health physicians and nurses was made possible by the generous assistance of the W. K. Kellogg Foundation. Of great value, also, have been the opinions of the Association as expressed in resolutions at the annual meetings and presented to appropriate authorities. These resolutions have related to the pasteurization of milk, control of tuberculosis, air pollution, accidents, fluoridation of water supplies, and many other subjects of major importance.

Probably no aspect of the Association better illustrates its work as a professional society than its contribution to the improvement of the status of sanitary inspectors. The important service rendered by them calls for adequate training. In 1935, the Canadian Public Health Association was permitted by the Government of Canada to grant a certificate in sanitary inspection to candidates meeting the requirements established by the Association. It was pleasing that the Association was accepted as an educational body by the Secretary of State of Canada. A correspondence course has been provided to assist in the training of candidates for the certificate. This work of the Association has been conducted for twenty-two years and today more than one thousand sanitary inspectors have received the Certificate in Sanitary Inspection (Canada). It has been appreciated that formal courses of instruction are required if adequate training is to be provided and two provinces, Ontario and Quebec, have met this need by formal courses extending over a period of six months and nine months, respectively.

The Association and several of the provincial associations provide sections which afford the opportunity for meetings and discussions among those engaged in special fields. In the national Association there are eight sections, the most recent being the Section on Medical Care organized last year at the annual meeting at St. John, N.B. An annual meeting of the Laboratory Section has been held at Christmas for the past twenty-four years and has been attended by more than one hundred members representing all parts of Canada.

To accomplish its work the Association needs the support of every public health worker. Less than half are members of their provincial public health association and of the national association. During this year the National Membership Committee and the provincial associations are presenting to all engaged in public health their responsibility for membership and a substantial increase in membership is expected.

Special Articles

A Dental Health Service in a Health Unit¹

E. D. ERICKSON, D.D.S.²

IT is my desire to outline briefly the operation of our dental health service in the Barons-Eureka Health Unit. As far as I can ascertain, this is the only health unit in the province of Alberta which offers a dental health service.

The area of the unit is approximately 55 by 70 miles and it is situated about 40 miles north of the International boundary. The roads are generally favourable, being hard-surfaced or well-kept roads. Our winters are rather severe, but are not as unpleasant as many of the more northerly units.

The health unit is made up of the municipal districts of Taber and Lethbridge and all towns and villages therein, except the city of Lethbridge. The headquarters are located at Coaldale and sub-offices at Barons and Taber, with resident nurses. The population distribution roughly corresponds to the location of the schools.

The condition of the teeth of the children in our health unit is extremely poor; anyone who has occasion to look into mouths of many children is appalled at the condition of their teeth.

In order to find out how much treatment was necessary, we made a recapitulation of examinations which were carried out last fall. All the grade 2 students in the health unit

area were examined (seven- and eight-year-olds) and a record was made of the number of teeth which required fillings or extractions. Six hundred and thirty students needed 2,950 fillings and 1,159 extractions, an average of 4.7 fillings and 1.9 extractions per child. Teeth which had previously been filled or extracted were not included in this survey and if they had been, the figures would have been much higher.

Prior to the commencement of this service, a meeting of the four dentists concerned was held to decide where to begin. They were in agreement that probably the greatest problem of the general practitioner is the prematurely lost first permanent molar, or six-year molar as it is often called. In order to help prevent its loss, it is apparent that it must be checked soon after eruption. In the grade 1 children, there are too many mouths in which these teeth have not yet come in, and by the time they reach the third grade, many of the molars are decayed beyond repair. This was the reason for rendering treatment to grade 2 students, and simple orthodontic and periodontal treatment, as well as emergency extractions for all other school children. Complicated orthodontics, bridgework, inlays, endodontia, and prosthetic services are beyond the scope of the health unit's service.

To begin our service, we set up a permanent clinic at the main office in Coaldale, and then equipped a sub-office at Barons with equipment

¹Presented at the annual meeting, Alberta Division, Canadian Public Health Association, Calgary, Alberta, August 29-31, 1956.

²Barons-Eureka Health Unit, Coaldale, Alberta.

which could be easily transported to Taber. We were very careful in the selection of equipment (which was almost all reconditioned) to make the best use of the money on hand. We found that by spending nearly \$2,000 for equipment and another \$1,000 for supplies, we were able to operate, carrying the small instruments back and forth from office to office. We had no X-ray machine at first but have acquired one recently. Thus we have served the children from the main office in Coaldale, from the Taber sub-office and from the Barons sub-office.

This has proved to be quite an effective arrangement, but there are still those who complain about bringing the children in for treatment, even though the service is free. The use of a dentally-equipped trailer, taken right to the school premises, has been tried with varying degrees of success in some health schemes. It might prove satisfactory in our health unit area where we have the advantages of good roads and a reasonably thickly populated area, even though it is mostly rural. It is a possibility to consider for the future.

Our staff consists of a dental-assistant-stenographer who assists at the chair and is in charge of all records, appointments, etc., and one full-time dentist. To begin with, several dentists were employed on a part-time basis, but this proved unsatisfactory as not enough work could be accomplished, nor was the continuity kept up which is necessary in this type of service.

Our examinations, which at present are confined to grade 2, are carried out at the schools, using a mouth mirror, explorer, chip blower, and natural light. This leaves something to be desired in the way of working

conditions, but it covers a large number of children in a short time and, if errors are made in the first examination, they can be rectified later when the child comes in for treatment. Those who have no apparent defects are given special attention before being pronounced dentally fit. A note is sent home with the child advising the parents of the work required and requesting written authority for the necessary treatment to be carried out. Appointments are made, and dental treatment begun. We send a copy of the appointment schedule to the teacher concerned, and she can be extremely helpful by reminding the children of their appointment times.

The nurses and medical officer of health carry out physical examinations on grade 1 and grade 3 children. They can see which teeth obviously require treatment and, in these cases, they advise the parent to have the work done privately. They also talk to the children in the classroom regarding proper dental care, with special emphasis on diet, proper toothbrushing habits, etc. We consider it our duty to speak to the parents at Home and School meetings and other similar gatherings if, and when, called upon to do so.

We cannot tell at the present time how effective our program is. It is a long-range scheme of prevention, education, and treatment, and the results of our efforts will be evaluated accurately only after several years have passed. To discharge our responsibility to the population and to the profession, we must conscientiously pursue this course, and I feel confident that our efforts will eventually be rewarded by an over-all improvement in the dental health of our people.

Evaluation of a Child Health Program in a Health Unit

J. J. STANTON, M.D., D.P.H.¹

IN the every-day administration in a health unit, one finds little time to assess its programs. However, valuable information and satisfaction can be obtained by the health officer and his staff, if time is taken to analyze programs.

In 1951, I succeeded Dr. G. Graham Simms, who had been appointed Assistant Deputy Minister of Health in the Department of Public Health in Nova Scotia, as director of the Northumberland Division or health unit in Nova Scotia. The unit serves 71,244 persons in three counties, namely: Pictou, 44,965; Antigonish, 12,400; and Guysboro, 13,879. The unit was highly organized by Dr. Simms and all births in the area were recorded on cards and filed in the division office. When a child was six months old a letter was sent advising the parents that the child should be inoculated and enclosing appropriate health education literature. When the child was one year old, the public health nurse made a home visit to check that the child had been immunized and to continue health education.

After studying the child health program, I decided to try a modification of the plan in one county by giving out birth notices to the nurses in the district, encouraging visits to be made to the babies as soon as possible. This replaced the yearly home visit. In most cases this procedure brought the nurse into the home in the first month of the infant's life. In this way, the nurse was able to discuss with the mother her problems and to assist her. The problems were many and varied. The mother was encouraged to have her post-natal examination by

her family doctor and also to bring her baby back for check-up. The doctor's instructions were also interpreted to the mother. Encouragement was given to having the baby immunized at three months of age. This program became very popular with the mothers and the family doctors. It even resulted in a vote of thanks being extended to the public health nurses by a local medical society. The plan was, subsequently, adopted in all of the division. To further the work, educational conferences for the nurses were held to enlarge the field of information given by them to mothers. In conducting the program, it was realized, however, that the small number of nurses could not see every baby and make repeat visits as well. Hence, a priority system was established placing premature infants first, multiple births second, and primiparas third. The nurses were also encouraged to take under supervision the above groups as well as problem babies. The coverage of these visits in the entire division was 88 per cent; in Pictou County 93 per cent; Antigonish County 80 per cent; Guysboro County 88 per cent.

As this program had been in existence for over three years, I was anxious to determine its effectiveness. The problem was to select an indicator. The deaths were analyzed but the number was so small that it was not a suitable index. Hence, the immunization status was chosen because each nurse encouraged the parents to have their infants immunized and if the mother paid attention to this item it was felt that she would also be paying attention to the rest of the teaching of the nurse. A year's group of infants were selected which were born between July 1, 1954 and June

¹Divisional Medical Health Officer, Northumberland Division, Department of Public Health, Pictou, Nova Scotia.

30, 1955. This allowed for the babies to have the opportunity to be immunized before January 1, 1956. In this one-year group, there were 1,743 living births. Questionnaires were sent out to the parents of these infants to determine their infants' immunization status. In this survey, it was found that 69 families had moved away and that 59 infants could not be located. This reduced our survey group to 1,615 infants. There were 961 infants in Pictou County, 362 in Antigonish and 292 in Guysboro. It was found that the percentage of infants immunized in the entire Division was 66 per cent; for Pictou County 73 per cent; Antigonish 66 per cent and Guysboro 42 per cent. This indicated that in Guysboro County, infants were not being immunized at the same rate as in other counties. This was a great disappointment. It was also interesting to compare the percentage immunized with the percentage visited. In the entire Division 88 per cent were visited and 66 per cent had been immunized. In Pictou 93 per cent and 73 per cent, in Antigonish 80 per cent and 66 per cent, and in Guysboro 88 per cent and 42 per cent.

In the Division there are forty-eight clinic centers. In three of the larger towns these are conducted on a monthly basis. In the rural areas four clinics are provided in the year. Due to travel difficulties, these are held in

the spring and fall months. However, the clinics are reasonably accessible. I desired also to learn how well these clinics were utilized and, therefore, determined where these children were immunized. It should be borne in mind that the findings relate only to the group of children immunized. The percentage of infants in the Division who were immunized at a clinic was 30 per cent and at a doctor's office 71 per cent; in Pictou, 27 per cent and 73 per cent; in Antigonish, 42 per cent and 58 per cent, and in Guysboro, 16 per cent and 84 per cent. It is rather significant that there is a major trend toward immunization by family physicians. This means that 46 per cent of the group in the survey were actually under the supervision of a family doctor. This, of course, is in keeping with the opinion that immunization is an integral part of the supervision by the family doctor.

In summarizing, our study indicates that nurses are visiting 88 per cent of all babies born; that nurses have undertaken supervision of nearly one-third of these infants and that nearly half of the infants are receiving some type of medical supervision as well. The program described is adaptable to a scattered population and it brings public health education into the home through the visits of the nurse with a family unit, centered about the newborn baby.

ASSOCIATION NEWS

The Department of Health of Ontario provides a formal course of instruction for sanitary inspectors including field work extending over nine months. Candidates meeting the requirements for the course are received primarily from Ontario but a limited number from other provinces may be accepted. The next course opens on September 23, 1957 and terminates June 23, 1958.

The Saskatchewan Branch of the Canadian Public Health Association held its annual meeting in Saskatoon on April 23 and 24 under the presidency of Mrs. Hester Kernen.

Planning has now commenced for the joint meeting of the Canadian Public Health Association and the Western Branch of the American Public Health Association which will be held in Vancouver in 1958. Committees have been formed and planning is now under way for the joint gathering. The joint convenors are Dr. Stewart Murray of the Canadian Public Health Association and Dr. G. R. F. Elliot of the Western Branch of the American Public Health Association.

On April 25 and 26 the New Brunswick-Prince Edward Island Branch held its annual meeting at Moncton, N.B. Dr. M. H. Brown, Professor of Public Health, University of Toronto, represented the national body at this meeting. A number of the papers presented will be published in the *Journal*.

It is pleasing that at the forthcoming meeting of the Canadian Public Health Association which will be held at the King Edward Hotel in Toronto on May 27, 28 and 29, four

distinguished contributors to public health will be presented with Honorary Life Membership. Dr. Fraser Brockington, Professor of Social and Preventive Medicine, University of Manchester, is to be honoured in recognition of his outstanding contribution to public health and in particular to the *Canadian Journal of Public Health*. Throughout the past ten years he has contributed a quarterly letter to the *Journal on public health in Great Britain*. Miss Florence M. Emory, well known to public health nurses throughout Canada for her work as the Associate Director of the School of Nursing in the University of Toronto for many years, and for her textbook on public health administration for nurses, will also be presented with Honorary Life Membership.

Professor E. G. D. Murray of the University of Western Ontario, the dean of Canadian bacteriologists, and Dr. Fred W. Jackson, formerly Director of Health Services and now Consultant to the Department of National Health and Welfare, Ottawa, will receive a similar expression of appreciation. Dr. Jackson was honoured at the last meeting of the American Public Health Association in being awarded the Sedgwick Memorial Medal. The occasion of the annual meeting, therefore, will be marked by the awarding of these honours and tribute will be paid to the recipients for their distinguished contributions.

The British Columbia Branch of the Canadian Public Health Association held its annual meeting in conjunction with the Public Health Institute on April 23. Details of the meeting will be published later.

NEWS NOTES

Federal

Hon. Paul Martin, Minister of National Health and Welfare, has announced that the Canadian delegation to the tenth Assembly of the World Health Organization, to be held in Geneva, Switzerland, early in May, will be headed by Dr. P. E. Moore, director of Indian and Northern Health Services. Alternate delegates will be Dr. Renaud Lemieux, Quebec, president, Canadian Medical Association; Dr. A. Somerville, deputy minister, Department of Public Health, Edmonton, Alberta; Max Wershof, Canadian permanent delegate to the United Nations, Geneva; and M. G. Clark, financial adviser to the Canadian permanent mission in Geneva.

In mid-March the Laboratory of Hygiene, Department of National Health and Welfare, moved from its Spencer Street quarters to a new laboratory building in west-end Ottawa. The new building is in Tunney's Pasture adjacent to the virus laboratory, opened in 1954, and the new food and drug laboratories occupied in 1955.

Dr. Roger B. Coyette, D.P.H., since 1953 a medical officer in the Epidemiology Division, Department of National Health and Welfare, has been appointed as assistant to the principal medical officer, health insurance studies. A graduate of McGill University and the School of Hygiene, University of Toronto, Dr. Coyette practised in Granby, Que., prior to joining the federal service.

Miss Dorothy M. Percy, chief nursing consultant, Department of National Health and Welfare, will be a speaker at the annual meeting of the Alberta Registered Nurses Association to be held in Edmonton, May 21-24. Her subject will be "Mental Hygiene, A National Challenge; Mental Health, A National Problem".

The Hospital Insurance and Diagnostic Services Act was given first reading in the House of Commons on March 25 and received final approval in the closing sessions of the House. Its purpose is to authorize contributions by Canada in respect to programs administered by the provinces providing hospital insurance and laboratory and other services in aid of diagnosis.

Hospital construction grants recently ap-

proved under the National Health Program include: *Newfoundland*: Cottage Hospital, Come by Chance, \$3,346; *New Brunswick*: Saint John General Hospital, \$350,000; *Quebec*: Hôpital St. Alexandre des Escoumains, Les Escoumains (Saguenay County), \$18,220; *Ontario*: Victoria Hospital, London, \$372; St. Vincent's Hospital, Ottawa, \$52,923; *Saskatchewan*: Neilburg Union Hospital, \$4,840; Rosthern Union Hospital, nurses' residence, \$6,000; Shaunavon Union Hospital, \$3,500; Lloydminster Union Hospital, \$1,000; Coronach Union Hospital, nurses' residence, \$3,000; *British Columbia*: Community Health Centre, Boundry Health Unit, Langley, \$8,583; *Yukon Territory*: Mayo General Hospital, \$20,653.

Four travellers in Canada under WHO fellowships have recently visited the Department of National Health and Welfare to confer with its officers. Dr. Hugh Murray, director of public health in the state health department of Tasmania, Australia, is studying methods of public health administration in Canada and the United States. In addition to Ottawa, he visited the Saskatchewan and Ontario departments of health, the Toronto and Ottawa city health departments and the School of Hygiene, University of Toronto. Also studying public health administration is Dr. Rouchdi Tarazi, secretary-general of the Ministry of Health and Public Assistance for Syria. Dr. Tarazi is scheduled to visit the Quebec provincial Department of Health and the Montreal department of health. Two of the visitors are from Martinique. Dr. C. F. Petit, chief physician in the civil hospital, Fort-de-France, visited Quebec City, Montreal and Ottawa to study child and maternal health services; and Miss Yolanda de Montaigne, a nurse and medical social worker in the social service department of Martinique's Department of Public Health, is scheduled to study mental health and child care services in Quebec City, Montreal and Ottawa.

National health grants totalling nearly \$29,000 have recently been allotted to the Children's Hospital, Montreal. About \$13,900 will be utilized to buy technical equipment for the department of experimental paediatrics to assist in the development of research facilities in this hospital

which is the paediatric teaching center for McGill University. The remainder of the grant will be used to assist with the establishment of a cancer clinic.

With assistance of an \$8,455 National Health Grant, a new glaucoma clinic is to be established at the Winnipeg General Hospital. This brings to ten the number of glaucoma clinics set up with grants' assistance. Already operating are clinics in Saint John, N.B., Quebec City, Montreal, Toronto, Ottawa, London and Vancouver.

The fourteenth biennial meeting of the Canadian Hospital Association combined with the twelfth Western Canada Institute for Hospital Administrators and Trustees, sponsored by the Saskatchewan Hospital Association will be held in Saskatoon, Saskatchewan, May 27 to June 1, 1957.

British Columbia

The poliomyelitis vaccination program in British Columbia is being expanded this year to include infants, pre-school children, senior high school students and, if possible, university students. This expanded program is possible because of the increased supply of vaccine from the Connaught Medical Research Laboratories.

On March 28, the Deputy Minister of Health, Dr. G. F. Amyot, officiated at the opening of a new sub-office of the Central Vancouver Island Health Unit at Lake Cowichan. This new community health center provides office accommodation for the two public health nurses who serve the area and a part-time clerk.

Before the closing of the last session of the Legislature the Minister of Health and Welfare, the Hon. Eric Martin, announced the intention of the government to implement a chronic care program as an extension of the present Hospital Insurance Service.

Alberta

A course for physicians and dentists at the Civil Defence College, Arnprior, Ontario, from March 4-8 was attended by eight physicians and one dentist from Alberta. Among them were Dr. H. Siemens of the Leduc-Strathcona Health Unit, Dr. D. MacKay of the Alberta East Central Health Unit, Dr. S. P. C. Casey of the Wetoka Health Unit, Dr. D. N. Keys of the Mount View Health Unit, Dr. J. A. Duncan of the City of Calgary Health Department, and Dr. E. S. Orford Smith of the Provincial Department of Public Health.

Miss Aileen Hogan, consultant in maternity nursing at the Maternity Centre Association, New York, was guest speaker at a course in maternal health from March 18-29 in Edmonton. The course was spon-

sored jointly by the Provincial Department of Public Health and by the Department of Extension in the University of Alberta, and was attended by twenty-four nurses from health units, from the Victorian Order of Nurses, and from obstetrical and maternity units of hospitals. Miss Esther J. Robertson, nursing consultant in the Child and Maternal Health Division, Department of National Health and Welfare, was able to attend the course during her annual visit to the Province. Miss Hazel Whittington, Supervisor of Public Health Nursing in the West Kootenay Health Unit at Trail, B.C., attended as a visiting observer.

Dr. Hugh M. Brown formerly with the Cariboo Health Unit at Prince George, B.C., has become Medical Officer of Health of the Athabasca Health Unit.

Saskatchewan

Medical health officers have been appointed to fill four vacancies in Saskatchewan health regions. All four appointees are recent arrivals in Canada. At Swift Current, Dr. Robert Bradley, a native of New Zealand, has taken the post of regional health officer which became vacant recently when Dr. Vincent L. Matthews was appointed to a senior position in the provincial department at Regina. Dr. Raymond Miller, who was born in County Tyrone, Ireland, has been placed in charge of the Moose Jaw Health Region. He succeeded Dr. Peter Peacock, who returned to his native South Africa to teach preventive medicine. The Assiniboia-Gravelbourg Health Region will be headed by another native of Ireland, Dr. T. Prestage. The position became vacant some time ago when Dr. M. K. Dehnell accepted appointment as medical officer of the Regina Rural Health Region. The post vacated in the Weyburn-Estevan Health Region when Dr. G. A. F. R. Gibson moved to British Columbia has been filled by Dr. W. J. Connelly, whose birthplace was Glasgow, Scotland. All four health officers have been exceptionally well qualified by training and experience in public health and preventive medicine to make important contributions to the regional programs.

Ontario

Dr. Colin G. Hunter, D.S.C., formerly Associate Professor in the Banting and Best Department of Medical Research, University of Toronto, has been appointed Professor and Head of the Department of Physiological Hygiene, School of Hygiene, University of Toronto. Dr. Hunter holds the degrees of B.Sc., M.B., M.R.C.P., D.P.H., and D.I.H. Dr. Hunter is a graduate of the

University of New Zealand and was formerly senior specialist in Pathology in the Royal Navy. He is a Fellow of the Royal Society of Medicine of London, the Royal Entomological Society, and the British Occupational Hygiene Society. His experimental work includes studies on external radiation injury, the metabolic response to traumatic injury, and the relief of the dehydration of water lack.

There has been an outbreak of infectious hepatitis at Elliot Lake, a mining townsite 40 miles from Blind River. The district has not been declared an epidemic area but all possible measures are being taken to prevent the spread of the disease and to help those suffering from it. Steady progress is being made in providing sewage disposal facilities and water chlorination equipment at the townsite but facilities for the large number of trailers scattered throughout the area present a different and greater problem. A University of Toronto research team is working in the area and gamma globulin is being used in protecting children and others who are most susceptible or in danger of infection. Sanitary and engineering officers from the Provincial Department of Health have inspected the area and are recommending temporary steps which will help in the control of the outbreak until the permanent facilities are adequate to cope with the great influx of new residents to the area.

Professor G. H. W. Lucas, University of Toronto, has been appointed chairman of a committee to study the establishment of a Poison Information Center in Toronto, which aims to decrease the number of deaths occurring from accidental poisoning, particularly in children.

Dr. Hugh E. Robertson, recently resigned superintendent of Essex County Sanatorium at Windsor, has been appointed Director of the Provincial Chest Clinic at Ottawa.

In 1956 mass X-ray survey units of the Ontario Department of Health's Division of Tuberculosis Prevention travelled 32,674 miles and X-rayed 335,636 persons in the province. The program of mass X-raying Ontario's population has done much in the detection of hitherto unknown cases of tuberculosis and other abnormal chest diseases such as heart conditions and lung tumours. An average of 85 per cent of survey reported active cases are newly discovered cases of tuberculosis. It is significant that surveys find more cases early than any other case-finding media. Over half of survey-reported cases have minimal disease. Since 1950 surveys have reported 45,419 cases of other diseases and abnormalities to the patients' physicians—an average of 7,570 per year. In 1956, 6,870 such cases were reported.

The appointment has been announced of Dr. Paul Christie of the staff of the Ontario Hospital, Kingston, as Director of the Community Mental Health Clinic at the Ottawa Civic Hospital. Dr. Christie succeeds Dr. H. W. Henderson, recently appointed Director of Community Mental Health Services of the Ontario Department of Health.

Nova Scotia

Miss Evelyn MacKay, R.N., Public Health Nurse, reported for duty in Dartmouth April 1957.

Miss Eunice Boyd, R.N., reported for duty in Antigonish April 1957.

Books and Reports

Mental Health Services in Canada. Report Number 1. HOSPITAL CARE. Published by the Canadian Mental Health Association, Toronto, 1956, 42 pages.

In 1954 the National Scientific Planning Council of the Canadian Mental Health Association decided to undertake a study of the mental health services in Canada. The members of the Council were convinced that the present design and administrative pat-

tern of treatment services were outmoded. It was argued that developments in psychiatric diagnosis and therapy in the last twenty years had so changed the perspective on mental illness that nothing short of a radical change from the traditional concepts was needed. The National Scientific Planning Council therefore established a Committee on Mental Health Services under the chairmanship of Dr. James S. Tyhurst of Montreal.

In January 1956 a draft report was

prepared by this Committee containing specific recommendations concerning the structure, organization and administration of mental hospitals. This report was fully discussed and certain amendments were made at the annual meeting of the Council held in February 1956.

The following is a summary of the conclusions and recommendations presented in the report: (1) A large-scale development of mental health services and facilities is required now in all parts of Canada since present services are inadequate for either hospitalization or community care. (2) As far as hospitals for mental illness in Canada are concerned, despite some notable exceptions, there is a tendency for development to lag behind essential need or to occur along out-moded lines. (3) The overcrowding of present mental hospitals should be carefully documented and emphasized across Canada. It is recommended that this information be the basis of a concerned public information program. (4) Services should be developed on a regional basis in natural demographic and geographic areas within limits of provincial administration. (5) No more large mental hospitals, or additions to existing large mental hospitals, should be built in Canada. (6) The future development of mental hospital facilities should be in close proximity to medical centers and, where possible, to medical training centers. (7) Future mental hospital development should be related intimately to the region served. These future hospitals should be regional mental hospitals of not more than 400-500 beds, their exact size subject

to local need, and they should be integrated with regional medical facilities in centers of population. (8) This recommendation for regional mental hospitals should be given careful attention with special regard to its consequences for other mental health services. These include psychiatric divisions of general hospitals, outpatient services, private practice, community mental health clinics, community consultation services, public education, etc. (9) Close attention will have to be given to the way in which community mental health services are organized. While the regional mental hospital may function as a community hospital in some areas, it may not be able to provide the full range of community services required for a comprehensive program in long-settled areas of considerable population density. (10) It is suggested that some form of community clinic will continue to play a central role in future developments of community mental health programs. (11) Mental health services should be planned on a co-ordinated and integrated basis. (12) Development of mental health services requires knowledge of the kind and distribution of need for service. It is recommended that epidemiological research be carried out to secure these fundamental data. (13) The development of mental health programs should always be accompanied by plans to evaluate such programs. (14) It is recommended that the Committee continue its review of mental health services and turn its attention to preparing reports on: (a) Community Mental Health Services and Community Programs, and (b) Professional Mental Health Personnel.

HEALTH FOR CANADIANS. *Rae Chittick. Published by the Macmillan Company of Canada. 373 pages. \$3.00.*

The author, Miss Rae Chittick, Director of the School of Graduate Nurses, McGill University, is to be thanked for providing this book for young Canadians and she is to be congratulated on the success of her effort. Two-thirds of the book is devoted to personal health, explaining how the body functions and what each individual can do to maintain its work efficiently. A third of the book is given to an excellent outline of community and world health problems and services. "It is Better to be Safe" is an effective chapter on accidents, and the inclusion of a chapter "New Discoveries Help Everybody" tells briefly the story of the introduction of insulin, sulphonamides, poliomyelitis vaccine and other recent advances in medicine. The book is very well illustrated and the illustrations are all up-to-date and add much to the interest. Teachers will appreciate the inclusion of a brief review of the major points at the end of each chapter followed by suggestions entitled "Something to Do". A glossary, too, is a valuable feature. "Health for Canadians" meets a real need and is an important new textbook, particularly for high school students.

FIVE HUNDRED OVER SIXTY, A COMMUNITY SURVEY OF AGING, *Bernard Kutner and David Fanshel, Alice M. Togo, Thomas S. Langner. Published by the Russell Sage Foundation, New York. 1956. 345 pages. \$4.00.*

Today, public health authorities are giving much thought to the problems of aging. The book is a com-

prehensive report of a study that was made of the needs of persons over 60 years. The Kips-Bay-Yorkville Health Centre in New York City, possesses well organized and effective health services but little provision has been made for the old people of the district. A carefully planned inquiry through personal interviews was made of 500 persons 60 years of age or over. The questions asked and the answers are analyzed in the text and in 87 tables. The study provides a better understanding of the needs and problems of the rapidly increasing aged population and points to types of community service effective in dealing with it.

HUNTERDON MEDICAL CENTER, THE STORY OF ONE APPROACH TO RURAL MEDICAL CARE. *Ray E. Trussell, M.D., M.P.H. Published by the Commonwealth Book Fund, Harvard University Press, Cambridge, Mass. Published in Canada by J. Reginald Saunders and Co. Ltd., Toronto 1. 1956. 236 pages. \$4.15.*

This is the story of the establishment of a medical center with a county-wide program in Hunterdon County, New Jersey. When a hospital was proposed in 1946 the community decided to study first their medical and health needs. As a result of the findings the Hunterdon Medical Center was opened in 1953. In this book Dr. Trussell discusses the development of the health center, its operation and notable features, and presents an evaluation of the project by participating general practitioners, specialists and the public. This book should prove of interest to public health workers, particularly those concerned with health and medical service in non-metropolitan areas.

